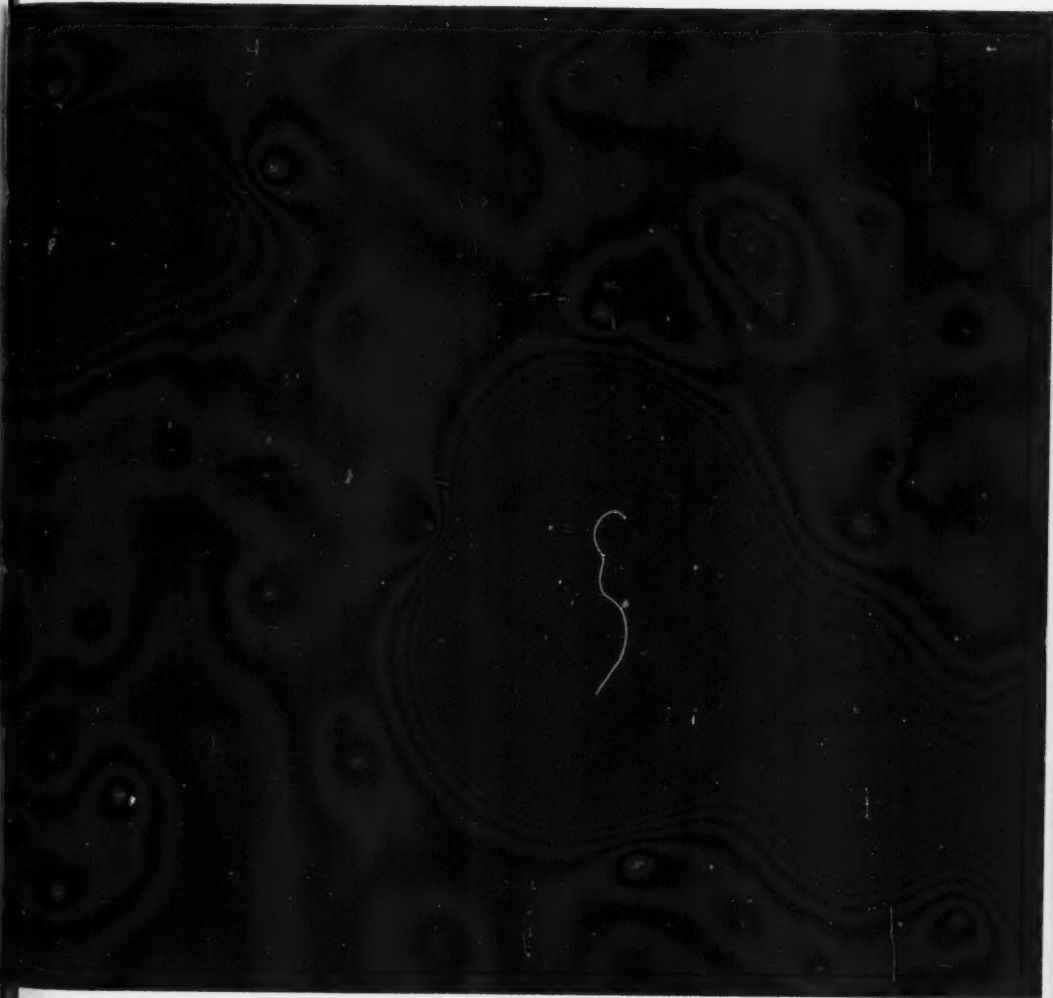


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MAGAZINE



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Gardenia jasminoides
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Water color drawing by G. A. C. Herklots

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G. HAMPELER

Ginkgo biloba grown as a bonsai at Longwood Gardens

Ginkgo—The Maidenhair Tree

HUI-LIN LI*

Ginkgo biloba, the maidenhair tree, is a most unique tree in many respects. As a species, it is the oldest one of all trees. As the only species of a whole order, GINKGOALES, botanically it is an isolated and most distinctive one, the lone surviving member of a once great and dominant vegetation of the world. It is a relic of the past, or, in the words of Charles Darwin, a living fossil. This very same tree was thriving a hundred and a quarter million years ago when dinosaurs were still roaming the earth. Indeed, it is a most precious and tenuous link between the present and the remote past. In the words of the eminent paleobotanist Sir Albert Seward [1938]: "It appeals to the historic soul: we see it as an emblem of changelessness, a heritage from worlds too remote for our human intelligence to grasp, a tree which has in its keeping the secrets of the immeasurable past."

Ginkgo is not only a tree of great botanical interest, but one which is of great horticultural value as well. As an ornamental, with its spreading, rigidly ramified branches and curiously shaped leaves, it is a tree of great distinction and dignity in appearance. The fan shaped leaves are nearly always notched at the tip, hence the name "biloba." It is also because of the general resemblance of the leaves to those of the maidenhair fern that gives it the common name maidenhair tree.

The original home of the tree is in China. From there it has spread in cultivation in modern times to all parts of the world. It is now probably one of the most esteemed trees in this country, especially valued for this purpose because of its upright habit, hardiness and durability, and freedom from insect pests. It is considerably planted in Philadelphia, New York, Washington, D. C., and many other large cities especially in the east. It is ironical that the oldest living species is better suited to the most modern man-made habitat than almost any other tree.

*Dr. Li, taxonomist of the Morris Arboretum and associate professor of botany at the University of Pennsylvania, is an authority on Chinese horticulture and botany. His most recent book, *The Garden Flowers of China* [1959], is a fascinating account of the horticultural contributions of that country.

Origin in China and Cultivation

Ginkgo was unknown to the ancient Chinese; its records in the literature cannot be traced definitely beyond one thousand years. The earliest Chinese civilization prospered along the Yellow River valley in northern China. Many plants have been domesticated there since time immemorial; among the trees there are the peach, apricot, pines, arborvitae, juniper, jujube, etc., but Ginkgo is conspicuously absent. It appears first in the literature in the early Sung dynasty in the 11th century as a plant native to eastern China, south of the Yangtze River. At Kaifeng, the capital in northern China, it was considered a rare and precious "fruit." It was first sent as a tribute yearly from its native region to the capital to be presented to the emperor. Subsequently a few trees were planted in the capital by Prince Li Wen-ho, and this is the first recorded instance of cultivation outside of its natural range. The tree was then named Ya Chio, meaning duck's foot, referring to the shape of the leaves. This is evidently the earliest name of the plant and possibly the name first known in its place of origin. After the nut became known in the capital, this name was regarded as vulgar, and another name, Yin Hsing or silver apricot was adopted, and the two names were often used concurrently. [Li 1956].

After its first introduction into cultivation in the capital, it also began to appear in poetry and in paintings. It was eulogized by famous poets, who mostly praised its "fruits" and sometimes also its leaves. Undoubtedly the praise of this rare "fruit" by the many renowned poets brought fame to this plant in northern China. These verses also established the fact that the tree was then growing wild in its native region, in the southern part of Anhwei province.

It is interesting to note that the earlier interest in the plant is because of the edible nut and the ornamental features of the plant. The "fruit," of course, is not a true fruit, but a drupe-like seed. It is yellowish when mature, of the size and

appearance of a small apricot but with a silvery bloom on the outside, hence the literary name Yin Hsing or silver-apricot. The inside kernel is edible. It began to appear in the herbals in the thirteenth and fourteenth centuries. It is noted in one of these early herbals that the nuts, if eaten in excess, especially by children, may be slightly poisonous. Ginkgo is described in detail in the great herbal Pen Ts'ao Kang Mu by Li Shih-chen in 1596. The author repeatedly says that it originates from Kiangnan, which at that time embraced the modern provinces Kiangsu and Anhwei. By then the tree was widely cultivated all over the country and also in Japan. The exact date of introduction from China to Japan is unknown but early records indicate it around the twelfth century when the Sung dynasty moved south and established its capital in Har'chow, very close to southern Anhwei.

Wilson [1920] is probably the original authority of the much quoted and repeated story about the origin of Ginkgo that it is a tree known since time immemorial in China and that it is preserved in cultivation only because of its association with Buddhism. As noted above the tree was not known to the ancient Chinese and its cultivation can only be traced to the eleventh century. It has also no association with Buddhism whatsoever except incidental planting on temple grounds. This planting could also happen on the temple grounds of the Taoists. It has always been the custom of the Buddhists as well as the Taoist priests to preserve portions of natural forests around their temples and to plant trees in their yards. Thus, venerable specimens are often found at these places, but they occur in many other places as well. Very old trees, Ginkgos as well as many other kinds, are often revered and preserved because of geomantic beliefs, and decorated sometimes with incense stands or wayside shrines. It is a kind of primitive nature worship, and the tree is honored because of its age and not its kind. The cultivation of Ginkgo has no religious origin or significance and its preservation is not attributable to planting by Buddhist or Taoist priests. Wilson's statement that "the tree reached Japan with Buddhism in the sixth century of the Christian era" is entirely unfounded, as Ginkgo was at that time not even yet known in China.

Introduction Into the West

Ginkgo was first made known to the western world by E. Kaempfer, a surgeon in the employ of the Dutch East India Company, who first observed it in Japan in 1690 and published in 1712 a description with a figure of the foliage and fruit. [Kaempfer 1712]. The tree was first introduced into the Botanic Garden at Utrecht. Jacquin brought it into the Botanic Garden at Vienna sometime after 1768. It was introduced into England about 1754. [Henry 1906].

Most of the earlier trees raised in Europe appear to have been males. The first recorded female tree was one found by DeCandolle near Geneva in 1814. Scions from that tree were grafted upon a male tree in the Botanic Garden at Montpellier, where the first perfect seed is reputed to have been produced.

Ginkgo was first introduced into America in Philadelphia. As far as authentic records go the oldest tree in this country is the one in Woodlands Cemetery, in West Philadelphia, which was introduced by William Hamilton from England in 1784. This is a magnificent specimen of a male tree. Harshberger [Wilson 1920] is of the opinion that the Ginkgo tree in the old Bartram Garden in West Philadelphia is the oldest and the first planted in America because the garden is older than that founded by Hamilton and the tree is larger. Elsewhere in Philadelphia, there are other large specimens scattered over the area. An old tree in Germantown, a male one, has a female branch grafted onto it, leading many to believe the Ginkgo is monoecious.

Botanical Investigations

The name Ginkgo was given by Kaempfer. Kaempfer's designation was adopted by Linnaeus, who in 1771, described the plant as *Ginkgo biloba*. In 1797, the English botanist J. E. Smith considered the name "uncouth and barbarous" and renamed it *Salisburia adiantifolia*. The latter name has no nomenclatural standing, however, as personal preference is not a valid reason to reject an older legitimate name.

When Ginkgo was first known to science, it was regarded as one of the conifers and generally included in the TAXACEAE. In 1895, the Japanese botanist Hirase [1895, 1898] made the startling

discovery that the ovules are fertilized by motile sperm-cells conveyed to them by pollen tubes. This differs radically from all other conifers, taxads, and flowering plants which have non-motile male nuclei. Motile sperm-cells are found only in the lower plants and in the ferns and cycads. This discovery established definitely the unique isolated nature of Ginkgo which was raised into ordinal rank by Engler.

Hirase's find is often claimed as one of the great discoveries in botany in the nineteenth century. His discovery, followed by further investigation by other botanists, stimulated many detailed studies on the various interesting features of this most unusual plant.

The Ginkgo is a deciduous tree. The branches are set with short spur-like shoots which bear clusters of fan-shaped leaves and flowers. The venation in the leaf is open and dichotomous. The male and female flowers are produced on different trees. The male flowers appear in pendulous catkins of numerous loosely arranged stamens. The female flowers arise usually in pairs, each a long stalk with two naked ovules. The seed is drupe-like with a fleshy outer covering enclosing a woody shell with a kernel.

All these structures and many other interesting details have been intensively studied by many botanists especially the unusual process of fertilization noted above and the nature of the ovule. The ovule bears a collar-like rim at the base, a structure that has given rise to much discussion. [Fujii 1896].

Geographical Origin

Since the middle of the last century when China was open to the exploration of the botanical collectors, most of these explorers were anxious to discover the native haunts of this famous plant, but though there were claims of finding this tree in the wild state, none seems to have received any recognition.

All botanists and foresters of Japan deny that Ginkgo is indigenous in any part of Japan, but was definitely introduced from China. Plant explorers sometimes observed the plant in parts of China in natural woods but these were often passed as escapes from cultivation or only in a semi-wild state. Often to deny the assertion that it still occurs wild in China, the statement to that effect made by Wilson, because of his extensive

experience in China, is usually quoted.

Wilson's exploration in China, although extensive, covers only a small part of the country. He collected especially in the Lushan area in northern Kiangsi in eastern China and more widely in western China in western Hupeh and Szechuan. As most of the curious conifers in China and Japan, which are many, have a very limited range of distribution, it is unsafe to make a categorical statement about their range and occurrence. For instance, the recently discovered and much discussed *Metasequoia* occurs in a small area in western China within the region extensively searched by Wilson on his many trips but was only narrowly missed by his itinerary.

Henry [1906] pointedly notes in 1906 that "its native habitat has yet to be discovered; and I would suggest the provinces of Hunan, Chekiang, and Anhwei in China as likely to contain it in their as yet unexplored mountain forests." None of the many modern plant explorers working in China during the last hundred years was familiar with the historical records of Ginkgo to guide them in their explorations, and Henry's statement, attesting to his wide knowledge of the Chinese flora and his sagacious observations, is closest to the truth. As noted above, early Chinese records clearly indicate that southern Anhwei, especially the area of Ningkuo and Suancheng, where Ginkgo originates. Both are now names of cities, but formerly Ningkuo was also the name of a larger district with modern Suancheng as its leading city. And in modern plant exploration, the most reliable reports of Ginkgo as a wild plant also came from this area, the mountain region along the border of Anhwei and Chekiang.

Frank Meyer, botanical explorer for the United States Department of Agriculture as quoted by Wilson [1916], states that "the Ginkgo grows spontaneously near Changhua Hsien, about seventy miles west of Hangchou in the Chekiang province, China". There "the trees are so common that they are cut for firewood.". Wilson says that "it is, however, by no means certain that this is the original home of the Ginkgo as these trees may all have descended from a planted tree". But he says further that "Meyer's discovery, however, is interesting, for there is no other evidence of the



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A gigantic specimen of the "Pai kwa shi" **Ginkgo biloba** in the Tan she temple west of Peking, China, which measured twenty-two feet in circumference (the main trunk) when this photograph was made in 1908. Five large and three small stems have shot up from the same base and the Chinese believe that this tree stays in close relation with the reigning dynasty—a new shoot developing as a new Emperor ascends the throne.

Ginkgo growing spontaneously or that it is cut for any purpose."

The area visited by Meyer lies in the western part of the Tien Mu Shan Range, along the northwestern border of Chekiang and southeastern Anhwei. It is in immediate continuation with the Ningkuo and Suancheng area where early Chinese records place the original home of Ginkgo. The highest mountain of this range reaches 5,075 feet.

Wilson's assertion that these 10 square miles of Ginkgos may have all descended from a planted tree seems to be highly improbable. Moreover, this area was visited subsequently by other Chinese botanists, and they also noted the same extensive occurrence of the Ginkgo tree in a spontaneous state. In the twenties and thirties, Ginkgo was observed and collected in that area repeatedly by Cheng, Tsoong, and others, and Cheng notes especially that "This tree is very common in Tienmushan, growing in association with coniferous and broad-leaved trees. It seems to grow spontaneously in that region". [Li 1956].

In this area and the surrounding regions, the Ginkgo also commonly occurs as a cultivated tree, more frequently so than in other parts of China. This is borne out by my own observations as I lived in southern Kiangsu for many years and also travelled extensively in northern Chekiang and southern Anhwei although not in the Tien Mu Shan area. As early as a hundred years ago, Fortune observed enormous specimens near Huchow and Ningpo in northern Chekiang and also in southern Kiangsu. In the nearby Chuki District, Tseng records a number of varieties of Ginkgo trees cultivated for their nuts. [Li 1956].

Southeastern China, especially southern Anhwei and Chekiang, is the home of many rare plants. Among the conifers and taxads, this is the native haunt of the monotypic endemic *Pseudolarix* and *Nothotaxus*, and also *Torreya grandis*, *Carya cathayensis*, and other rare species. It is the refuge of many relic plants. The case of Ginkgo is very similar to *Torreya grandis* and *Carya cathayensis*, which occur also in this area both in wild and cultivated conditions, for their edible nuts. Undoubtedly, the last refuge of Ginkgo lies also in this area, a fact not only sustained by historic records but also corroborated by the observations of modern botanical explorers.

Ginkgo is sometimes also observed in a supposedly wild or semi-wild state in other parts of China, especially in the mountains of the southwest, in Kweichow, Szechuan, etc. It may be that the natural range of Ginkgo is fairly wide and scattered, but undoubtedly the area in southern Anhwei and northern Chekiang in eastern China is the center of origin of all the cultivated trees, both in China and Japan as well as in other parts of the world.

Ginkgo in Cultivation

Ginkgo is now widely cultivated all over the world. It thrives well in temperate climates and in North America it grows as far north as eastern Massachusetts and central Michigan and in parts of Canada along the St. Lawrence River. It grows in various situations but is generally more successful on deep, well drained and rich soil.

Ginkgo is used as either a specimen tree or as an avenue tree. Because of its distinctive and picturesque effect, and its potentiality in attaining great size and age, it is of particular value for solitary planting.

As a street tree, it thrives in cities big and small and is tolerant of congested situations and sooty atmospheric conditions disastrous to many other trees. It can be freely pruned, another desirable quality in a street tree. It is also well adapted for cultivation in containers, and may be trained into low bushy form. In Japan, it is sometimes grown as a dwarf tree in trays.

Ginkgo is readily propagated by seeds, stratified in autumn. Between 265 and 272 seeds weigh one pound. The seeds germinate in about fifty days after sowing. [Chun 1922].

Ginkgo has long been considered difficult to propagate by cuttings. With auxin treatment, however, propagation by cuttings can be partially successful. Grafting, budding and layering can also be practiced, and these methods as well as cuttings are especially desirable for obtaining male trees for planting.

The female tree, because of the disagreeable odor of the fleshy covering of the fallen seeds, is less desirable than the male tree in cultivation, especially as street trees. It is claimed that there are some differences in the growth habit of the two sexes, the male trees being more pyramidal and the female more spread-



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*A fairly nearby view of the peculiar growth from a large limb of the **Ginkgo biloba** which very much resembles stalactites. These growths look much like aerial roots. The tree in the Zeupukuji Temple grounds, Tokyo, was twelve feet in circumference when the photograph was made in 1929.*

ing, and that the male trees tend to lose their leaves earlier in the autumn. These characters, however, do not appear to be constant enough to be relied upon. As it takes many years for the trees to flower, it is highly desirable to devise some way of telling the sexes in young trees. Recent studies have shown that there is some difference between the chromosome apparatus of the male and female trees. If a simple technique can be devised to study this chromosome phenomenon, it would be of great help in eliminating young female trees in horticultural plantings.

In both China and Japan, there are now many specimens of immense size. Miyoshi [1931], gives an account in German on specially noteworthy living specimens in Japan. On very old trees there often develop peculiar burs which are called nipples, "chi-chi", in Japanese. These are due to abnormal development of dormant or adventitious buds. If these hanging burs reach the ground, they take root and bear leaves. [Fujii 1895].

I have observed this phenomenon on many old trees growing in China and Japan. An old tree at Kew Gardens in England, planted some two hundred years ago, is also showing an incipient stage of this development and there are reports of these bur-like growths on several trees on the European continent. No tree in America has been observed to have such a beginning of growth.

In Japan, however, I have observed this condition also on many trees of a relatively young age. Ginkgo is the most widely and commonly planted street tree in Tokyo and there are tens of thousands of these trees lining the streets. These trees are nearly all of the spreading type and the branches are often severely and carelessly pruned. On the campus of Tokyo University and along the surrounding streets, Ginkgo is especially extensively planted. Many of these are about fifty years old and some of these also bear burs of various sizes on the lower side of the main branches close to the trunk. On closer observation, it can be readily seen that they are nearly always developed on trimmed branches or stumps of branches remaining on the trunk. This development thus apparently is not only the result of old age but also of wounds causing disruption of normal sap flow.

Cultivated Varieties

In cultivation, there are a number of varieties recognized in China and Japan. It remains to be seen whether the different cultivated forms of European authors originated in the Orient or developed independently under cultivation in European gardens. Among the trees in Japan, there are cases of abnormal fruit formation, observed as early as 1891 by Sharai. On certain trees, fruits are produced on the surface of ordinary leaves of the trees. This kind of tree was recognized by Makino as var. *epiphylla* Makino in *Jour. Jap. Bot.* 6 (1): 5. 1929. No such trees have been observed in either Europe or America.

Accounts of cultivated varieties in Europe were given by such early authors as Carrière [1867] in French, Beissner [1887] in German and Henry [1906] in English. The varieties recognized by these European authors are also given in Rehder's Manual, but with the exception of fastigate forms, it is doubtful that any of the other forms are in cultivation also in the United States. These varieties are as follows:

- 'Aurea'—with bright yellow leaves.
- 'Fastigiata'—branches ascending, forming a narrow-pyramidal or columnar tree, with ascending branches.
- 'Laciniata' = 'Dissecta'—with larger, deep dissected or incised leaves.
- 'Pendula'—with drooping branches.
- 'Variegata'—with yellowish variegated leaves.

The fastigate form is the commonly planted street tree in Philadelphia.

Recently there have been attempts made to select and propagate desirable forms in this country. Edward H. Scanlon of Olmsted Falls, Ohio, has selected and named the following clones:

- 'Lakeview'—a broadly pyramidal form.
- 'Mayfield'—a narrow tightly branched fastigate form.
- 'Palo Alto'—a "nicely formed specimen representing the species."
- 'Santa Cruz'—a low spreading umbrella-like form.

Diseases

Ginkgo seems to be free from any insect infestation. The leaves are used in China and Japan as book marks, reputed to keep silver fish and other worms away from their tomes of loose sheets of bamboo or wood-fibers. The wood is highly valued for making insect-proof



U. S. FOREST SERVICE

An example of Ginkgo biloba being used as a street planting

The Santa Cruz Ginkgo—a low spreading umbrella-like form

E. H. SCANLON





E. H. SCANLON

*The Mayfield Ginkgo in winter, showing its narrow,
tightly branched, fastigate form*



E. H. SCANLON

The broadly pyramidal Lakeview form of Ginkgo biloba

cabinets. It seems that there are natural insect-repellent properties in the tissues.

There are few if any diseases caused by pathogens and at least none of any serious nature. It is occasionally subjected to leaf scorch but this is perhaps due to physiological rather than pathological factors. Sometimes, it is effected by leaf spot fungi or wood-rot fungi, pathogens more or less commonly affecting trees in general. These troubles are nearly always induced by physical damage. If care is taken to protect the trees from damage by automobiles, lawn mowers, or cutting by children, the trees are relatively free from any disease.

The young seedlings sometimes suffer from damping off. Again this is due to physiological conditions, and if the growth environment can be kept healthy, and care is taken in regulating the moisture content and temperature of the soil, and in providing the right amount of exposure, this trouble can be easily overcome.

Uses

The main use of Ginkgo is horticultural, as an ornamental or shade tree. The wood, although of good quality and possessing an insect repellent property, is little used because of its very limited supply, even in the Orient. The wood is soft but straight grained, light brownish in color with a silky sheen. In the Orient, it is used for making small storage cabinets, or abacus beads, seals and other small fancy articles. In Japan it is also extensively used for the ground work of

the lacquer ware. The Japanese sometimes use the leaves for fertilizer, especially in rice fields under water. [Chun 1922].

The outer fleshy pulp of the "fruit" has a foul odor. The inner kernel, with a white shell enclosing a soft flesh is edible. It is supposed to promote digestion. The kernel can be roasted whole, or shelled and cooked with meat or fowl. It is sweetish and with a slightly resinous flavor.

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U. S. DEPARTMENT OF AGRICULTURE

Patio de la Ría, gardens of Generalife, Granada

Horticultural Centers in Spain and Portugal*

FREDERICK G. MEYER**

Introduction

Europe long has been the chief source of ornamental plants for American gardens, and remains vastly richer in sources of these plants than does the United States. Reasons for this lie in the much longer cultural heritage still strongly entrenched in all of the European states, and the longer history of plant introduction in Europe, dating back more than four hundred years when the first tulips were introduced from Turkey. American horticulture, now more than ever before, exhibits renewed interest in gardening on a scale never before witnessed in this country.

From March to November 1957, a trip for ornamental plants covered areas in Italy, southern France, Spain, Portugal, England, and Scotland. This trip was made possible through the New Crops Research Branch, under a cooperative agreement between Crops Research Division, Agricultural Research Service, United States Department of Agriculture, Beltsville, Maryland, and the Longwood Gardens of Longwood Foundation, Inc., Kennett Square, Pennsylvania.

Objectives of this expedition were as follows, to introduce: (1) Species with potential as ornamentals not in cultivation, (2) elite clones (cultivars) of the simple species not in cultivation, (3) hybrids not in cultivation, (4) races or ecotypes of the wild species as a source of new germ plasm for plant breeding, and (5) reintroduction of species, hybrids, or cultivars rarely grown or lost to cultivation for wider distribution. Arrangements with the United States Plant Quarantine authorities through the facilities of the Plant Introduction Station, Glenn Dale, Maryland, permitted the introduction of plants that normally are

prohibited entry into this country. About twenty-eight hundred introductions originated from visits to eighty botanic gardens, private gardens, experiment stations, nurseries, and arboreta. As an overall long range objective, it is hoped for these introductions to take a place in the reservoir of ornamental plant materials available for the enrichment of American horticulture.

Spain

The kaleidoscopic history of Spain brings to mind a rich artistic heritage, always colorful and intensely emotional, feelings largely expressed in the appreciation of art, especially in painting, music, architecture, and gardens. Indeed, the Moorish gardens of Granada are unique in all Europe. The Royal gardens of La Granja near Segovia and those at Aranjuez built in the seventeenth and eighteenth centuries are the equal of any of the historical gardens of Europe.

New plant material of horticultural merit is found almost entirely in a few outstanding private gardens, notably those of the Pinya de Rosa and Marimurtra along the Costa Brava and in the several botanical gardens located in Santander, Santiago, Madrid, Barcelona, and Valencia. Nurseries, although not abundant in Spain, are located chiefly in Barcelona and Madrid. The rose nurseries near Barcelona are particularly well-known and one of the largest shrub nurseries visited in Madrid produces nursery stock of first quality. The production of glass-house plants is generally appreciated, and in the larger cities excellent quality material is available.

Gardens of Spain largely follow traditional patterns in the use of rather well-known plant material, widely grown in gardens throughout the Mediterranean region. The more modest Spanish gardens fall into two main categories. In many Spanish cities, balcony gardens filled with pelargoniums, petunias, and

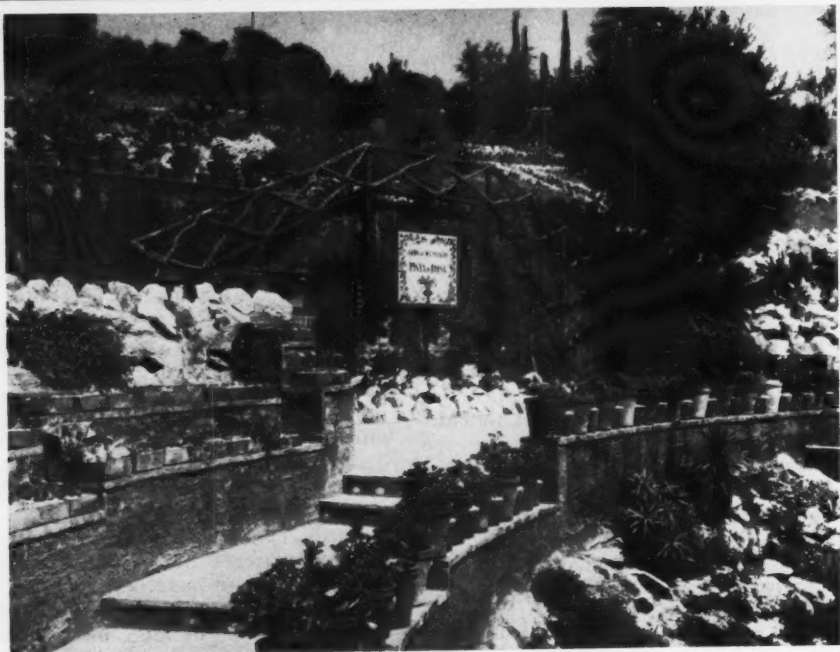
*Selected articles, revised from *Plant Explorations: Ornamentals in Italy, Southern France, Spain, Portugal, England, and Scotland*, by Frederick G. Meyer, ARS-34-9, October 1959, U. S. Department of Agriculture in cooperation with Longwood Gardens of the Longwood Foundation, Inc.

**New Crops Research Branch, Plant Industry Station, Beltsville, Maryland.

Gardens of Pinya de Rosa and coast of Spanish Riviera, called the Costa Brava

F. RIVIERE-CARALT

F. RIVIERE-CARALT

*Portion of Señor Riviere's collection of succulent plants*

long streams of ivy pervade as the mode of gardening in the tightly packed houses along the narrow winding streets. Toledo, Seville, and Valencia are outstanding for this custom. The patio is the traditional garden of all Latin countries and is very common in Spain, where outdoor gardens consist often of oleanders, pelargoniums, boxwood, myrtle, petunias, ivy, and cypress grown in terra cotta pots, glazed jardiniers, or tiled flower boxes. Space often is limited and water in most areas of southern Europe is often scarce. This is especially true of Spain.

The larger Spanish cities and towns are copiously planted with trees and the public parks are attractively groomed. In April, flowering horsechestnut trees, *Aesculus hippocastanum*, along the streets of Madrid are to be remembered as a special embellishment of the Spanish capital city. The Retiro Park is the largest in Madrid. In Barcelona there is the beautiful Montjuich Park. The municipal park of Malaga is particularly interesting, since it is planted with a rich assortment of subtropical plants suited to the southern climate. The Spanish Horticultural Society has headquarters in Madrid.

Collections of wild *Narcissus* and kinds of broom, *Cytisus*, *Genista*, and *Sarothamnus* were the only wild plants collected in Spain. An opportunity exists still for further exploration in quest of wild plants in both Spain and Portugal, since the wild flora of these countries is one of the richest in Europe.

Granada

Gardens of the Generalife

The Moorish gardens of Andalusia in the south of Spain are unique in being the only real pleasure gardens constructed in Europe during the Middle Ages. The best of these, the gardens of the Generalife, often called the gardens of Arif, were completed by 1350. The harmony created by the skillful blending of masonry, plants, and water instills in most visitors a spiritual quality long to be remembered. A labyrinth of pools, fountains, and running water fed by gravity from the neighboring Sierra Nevada mountains creates a virtual aquatic symphony throughout the garden. Above all, water is perhaps the most unique feature of the garden, since in every

patio and court running water is the predominating feature. Mediterranean plants are prominently used in the basic plantings and include the boxwood, *Buxus sempervirens*, and the myrtle, *Myrtus communis*, both extensively used as low clipped hedge plants. The oleander, *Nerium oleander*, is also much-planted. The palace buildings are lavishly constructed in what is recorded as some of the finest of Moorish architecture, and the site of the garden as it stands on a spur of the hills behind Granada commands a sweeping view of the city and distant vega beyond. The long avenue of Mediterranean cypress, *Cupressus sempervirens* is a modern embellishment that is most pleasing as one enters the garden, if not altogether accurate in the historical setting.

Blanes

Pinya de Rosa

Pinya de Rosa, garden of Señor Fernando Riviere de Caralt, outranks in scope all other modern private gardens of Spain. Begun in 1940, the garden is designed to impart the Catalanian flavor of this part of northeastern Spain. The garden covers about sixty acres, along the picturesque Spanish Riviera at Blanes, some fifty miles north of Barcelona. Few gardens in southern Europe are being developed more vigorously or more rapidly.

The collections consist largely of succulents, since these plants readily acclimatize in the Mediterranean environment. Señor Riviere has assembled a very large collection of *Opuntia* and other American cacti. South African succulents of the Figmarigold Family also are abundantly represented such as *Ruschia*, *Lampranthus*, *Carpobrotus*, *Glottiphyllum*, and many others.

The garden is expanding to include ornamental shrubs, trees, and herbaceous plants. A roadside bank some two hundred feet long is planted to the creeping, lavender-flowered *Convolvulus mauritanicus*, a North African species. Indeed, few plants are more appropriate for terraces and banks, or for a hanging basket. The rock garden includes some fine specimens of *Pelargonium acetosa*, a beautiful species with fleshy glaucous leaves and pink, red-striped flowers.

The greenhouses are stuccoed on the exterior in the characteristic deep buff color of Catalanian dwellings. Collec-



SAGARRA

Tropical greenhouse at the Pinya de Rosa. *Alocasia macrorrhiza* 'Variegata' is the low-growing aroid with white-variegated leaves in foreground. *A. portei* along the pathway with fifteen-foot leaves is a striking species from the Philippines.



FUNDACION CARLOS FAUST HORTUS BOTANICUS

Botanical garden of Marimurtra, Blanes, Spain

tions under glass are devoted to orchids, aroids, peperomias, and other tropical species. Two aroids of special interest include *Alocasia portei*, from the Philippines, with enormous pinnately divided leaves fifteen feet long, and *A. macrorhiza* 'Variegata,' with blotched-white leaves, four to five feet long.

Attractive, specially designed porcelain labels are provided for many plants growing in various parts of the garden.

Jardin Botanico "Marimurtra"

"Marimurtra," formerly the private estate of Carlos Faust, is maintained as a private botanical garden according to the wishes of the late owner.

The garden covers about forty acres on a high promontory above the Mediterranean at Blanes adjoining the garden of Pinya de Rosa described previously. Succulents predominate among the plantings. *Kalanchoe faustii* grown in the garden commemorates the name of the founder. Trees, shrubs, and herbaceous plants adaptable in the Mediterranean climate are extensively planted. The collections include about four thousand kinds of plants.

Native Aleppo pines, *Pinus halepensis*,

form an extensive open woodland as a background for the plantings of exotic plants. A pergola is covered with *Wisteria sinensis* and the handsome hybrid trumpet vine, *Campsis* \times *tagliabuana* 'Mme. Galen'. An adjoining formal garden is planted with multicolored crotons and other subtropical foliage plants. A new extension to the garden is being developed as an arboretum.

Introductions from this garden include *Notelaea excelsa*, an evergreen shrub to small tree, eight to twenty feet tall with black olive-like fruit, a native of the Canary Islands; *Cneorum tricocon*, a native Mediterranean broad-leaved evergreen with boxwoodlike foliage, attractive throughout the year, especially in late summer when the two- to three-foot plants are laden with ripening red capsules; and *Rhagodia nutans*, an Australian scrambling herb related to *Chenopodium*, now naturalized in various parts of the garden. The small fleshy leaves and small bright red fleshy fruit are attractive. *Rhagodia* is reputed to be valued for forage in Australia. A beautiful specimen of *Araujia sericifera*, a milkweed relative from Peru, scrambles over the loggia of the garden residence.



U. S. DEPARTMENT OF AGRICULTURE

Sophora japonica 'Dot', an unusual cultivar with pendulous, tortuous branches and wavy-margined leaves. Unknown outside of Spain. Specimen in botanical garden, Barcelona.

Barcelona

Jardín Botánico

The botanical garden in Barcelona occupies an area of about fifteen acres in an old woodland adjacent to Montjuich Park. This garden has been under development only in recent years through

cooperative efforts of the park department of the City of Barcelona and the botanical institute of the University.

Evergreen holly-oaks, *Quercus ilex*; sycamores (*Platanus* \times *acerifolia*); elms, *Ulmus* spp.; stone pines, *Pinus pinea*; and Aleppo pines, *Pinus halepensis*,

form the basis of the older plantings. About a thousand recent introductions have been incorporated into the permanent plantings.

The most unusual tree in the collection is *Sophora japonica* 'Dot', with wavy-margined leaves and contorted pendulous branches. This cultivar of the Japan pagoda-tree originated in the nursery of Simon Dot near Barcelona about 1920. Apparently it has never been grown outside the Barcelona area.

Madrid

Jardín Botánico

The Jardín Botánico in Madrid has long stood among the well-known botanical gardens of Europe. Founded in 1781, this garden developed rapidly at the end of the eighteenth century and early part of the nineteenth as new plants were brought to Spain from the colonies in the New World. The *Dahlia*, for example, first entered Europe in 1789 via the botanical garden in Madrid.

The Jardín Botánico covers about thirty acres. A wall encircles the garden except where imposing iron-grill entrance gates intercept at several points. A series of broad walks parallel nearly the full length of the garden and divide the plantings into large rectangular blocks. Shrubs and herbaceous species grown according to phylogenetic relationships are planted in beds between the tree-lined walks. Part of the garden is set aside for experimental purposes. Conservatories are located near the garden entrance on the Plaza de Murillo. The historic building of the herbarium and library commands a major focal point among the architectural and scientific features of the garden.

At an altitude of two thousand feet, the climate of Madrid is not the most propitious for growing plants. Extremes of temperature are commonplace. Sweeping winds across the arid plains of New Castile bring biting cold in winter and torrid blasts in midsummer. In April, spring arrives and long avenues of horsechestnut, *Aesculus hippocastanum*, burst forth into flower along the main thoroughfares of the city and in many parts of the botanical garden.

The collection of hardy plants in the Jardín Botánico consists largely of a small assortment of cool-temperate species, planted mostly many years ago.

There appears to be very little activity now in the way of new introductions and the garden is suffering with an aura of neglect. Some of the old trees, though, should be mentioned. Specimens of *Celtis australis*, often called the lotus tree, are of special note. Trees of this south European, Asia Minor, and North African species in the botanical garden are over a hundred feet tall and three feet in diameter. The smooth white bark is especially distinctive in old trees. In its native habitat, records indicate specimens may attain an age of a thousand years and a diameter of six feet. The lotus tree is recommended for wider distribution in areas of southern United States. Specimens of *Zelkova carpinifolia* from the Caucasus are nearly as large as the lotus tree. *Z. carpinifolia* is hardier than *Celtis australis* and deserves wider recognition as a substitute for diseased American elms. The fern-leaved linden, *Tilia platyphyllos* 'Laciniata', is included among the more uncommon trees. American trees in the Jardín Botánico include the persimmon, *Diospyros virginiana*; the osage orange, *Maclura pomifera*; and several young vigorous specimens of the giant sequoia, *Sequoiadendron giganteum*. A collection of Spanish grape cultivars is growing on several hundred feet of arbor near the museum and greenhouses. Of the palms, only *Trachycarpus fortunei* and *Chamaerops humilis* seem to flourish in the rigorous climate.

A few greenhouse plants are of special interest. *Piper ornatum* is a handsome climbing stovehouse pepper with lustrous leaves mottled pink and pink veins. Indeed, this first-rate foliage plant is practically unknown in the United States. *Vellozia elegans*, of the Vellozia Family, a lily relative, is a houseplant of some merit, with white flowers that turn green with age and last for many weeks on lax six-inch peduncles. They are borne between the densely tufted lustrous green leaves. *Achimenes lanata*, with small light blue flowers and white-woolly leaves, is somewhat less showy than the well-known *A. longiflora* and *A. grandiflora* types.

Nursery of Bourguignon

The nursery of Bourguignon, located on the edge of Madrid, operates a completely modern establishment compar-



U. S. DEPARTMENT OF AGRICULTURE

Specimens of the south European hackberry, Celtis australis, about seventy-five feet tall in botanical garden, Madrid

able with the best of the nurseries seen in the Mediterranean countries. A display sales room, for example, serves customers on a cash-and-carry basis, a method rarely seen in European nurseries. The quality of the merchandise offered is first-class. The hardy nursery stock available includes a wide selection of

ornamental trees, shrubs, herbaceous plants, and fruit trees, but mostly of kinds widely grown in southern Europe and in parts of the United States.

A rarely grown plant in the collection is *Roupala pohlii*, a Brazilian woody species of Proteaceae closely related to the silk-oak, *Grevillea robusta*. The ele-

gant pinnately divided lustrous foliage of *Roupala*, in the opinion of the writer, highly recommends this plant for wider cultivation as a pot plant. *Roupala* now is rarely grown in the United States, lacking a steady source of seed, and difficulties, experienced by Europeans, in propagating this plant vegetatively.

Aranjuez

Royal Gardens, Jardín de la Isla

Aranjuez is a small town, about thirty miles south of Madrid, bordering the Tagus River. The history of the place has been dominated by the Spanish Royal House since the fourteenth century. Lofty English elms (*Ulmus campestris*) and sycamores (*Platanus* \times *acerifolia*) are extensively planted within the environs of the town and create a veritable oasis in the otherwise arid and barren plain of New Castile.

The Jardín de la Isla covers several acres adjacent to the Royal Palace and the Tagus River that flows through the grounds of the Royal estate. Constructed during the reign of Philip II in the sixteenth century, the design of the garden imitates the Italian style in garden art of the late Renaissance period. Fountains and clipped boxwood hedges epitomize the basic features of the Royal Gardens.

A modern trend for tree-planting has virtually turned the Jardín de la Isla into an arboretum. The collection of trees, though, can hardly be called extensive. A long row of rather drought-stunted *Magnolia grandiflora* borders one side of the garden. The crapemyrtle, *Lagerstroemia indica*, is much-planted and specimens fifteen feet high are common in various parts of the grounds. Several English yews, *Taxus baccata*, are over thirty feet wide and fifteen feet tall. Specimens of *Fraxinus excelsior* 'Pendula', the weeping European ash, are fifteen feet tall with a branch spread of over twenty feet. In spite of the aridity, specimens of the California redwood, *Sequoia sempervirens*, are now upwards of a hundred feet tall.

Viveros Castilla

One of the largest of Spanish nurseries, the Viveros Castilla, S. A., oper-

ates four separate nurseries, two near Madrid and two at Aranjuez, thirty miles south of Madrid.

The nursery visited at Aranjuez covers about fifty acres planted largely to conifers, roses, broad-leaved and deciduous shrubs, and to a lesser extent, herbaceous plants. The entire acreage is under irrigation. Many of the species conifers are grown from seed in open raised beds. The junipers in this region are superior to all conifers in cultivation as nursery stock. Large blocks of the Chinese juniper, *Juniperus chinensis*, and lesser amounts of the American redcedar, *J. virginiana*, are under cultivation. Both bush and standard roses, principally hybrid teas, are grown in large blocks for the wholesale market. An interesting summer flowering shrub in the nursery is *Perovskia atriplicifolia*, a member of the Mint Family from Afghanistan with silvery-gray foliage and handsome bright-blue flowers on three-foot stems. This plant is tolerant of hot, dry climates and deserves to become better known, particularly in southern and western areas of the United States.

Shrubs grown in quantity include *Berberis julianae*; *Viburnum rhytidophyllum*; *Spiraea* \times *vanhouttei*; and species of *Forsythia*, *Ligustrum*, and *Buddleia*. The Van Houtte spiraea is one of the commonest dooryard shrubs grown in Mediterranean gardens.

Seville

Viveros Andres

The nursery firm of Señor Andres is the only sizable establishment of its kind serving the Seville area, in a city of about a hundred and fifty thousand inhabitants. Production of nursery stock is limited mostly to trees and shrubs. *Forsythia* spp., *Ligustrum* spp., *Spiraea* \times *vanhouttei*, *Prunus cerisifera* 'Pisardii', *Populus alba* 'Pyramidalis', *Ulmus pumila*, and *Robinia pseudoacacia* are grown in large quantities for the local market. A major part of the business involves the sale of bitter orange stock, *Citrus aurantium*, for growing in the Seville area.

A vigorous, large-leaved form of the ivy, *Hedera helix*, is included in a small selection of perennials and pot plants offered by Señor Andres.



VIVEROS CASTILLA, S.A.

Royal Gardens, "Jardin de la Isla," Aranjuez



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*Typical Portuguese ornamentation leading into the formal garden
Jardim Botânico, Coimbra*

Portugal

Portugal is abundantly supplied with gardens and horticultural institutions. A profound interest in horticulture and gardening is part of the Portuguese tradition.

Northern Section.—In the springtime, few areas of western Europe can compare with northern Portugal. The mild, relatively moist belt around Oporto receives a rainfall of approximately thirty-five to forty inches a year. As a result, northern coastal Portugal remains perpetually green. In March and April, native species of heather and numerous species of woody legumes carpet the northern Portuguese hills in a kaleidoscopic riot of color. The arborescent heathers, *Erica australis*, with light to dark pink flowers, and *E. lusitanica* with white flowers are shrubs four to five feet tall. The lower growing, *E. umbellata*, twelve to fourteen inches tall, with deep purple flowers, covers vast areas.

Showy native shrubs of the Legume Family, mainly species of *Cytisus*, *Genista*, and *Ulex*, with yellow or white flowers contribute no less to the checkered display. Large areas of northern Portugal are planted to the native cluster pine, *Pinus pinaster*, often maliciously delimbed and cut in many areas as a source of firewood. *Eucalyptus globulus*, a well-known Australian tree, assumes the role of a native plant in all northern coastal areas and inland valleys. Another Australian tree that contributes much beauty to the landscape is the silver wattle, *Acacia dealbata*, now widely naturalized in Portugal. Long rows of this species line the roadways of northern Portugal; and in March, when the tree is swathed in yellow flowers, few sights are more appealing.

Oporto is the major center of horticultural activity in northern Portugal. This is the center of the nursery industry. The acidic soils of the northern districts are well-suited for growing rhododendrons, azaleas, and camellias. Oporto deserves acclaim as the home of the camellia in Europe, since the oldest specimens in cultivation on the Continent allegedly are growing here. Flaming-red rhododendrons and azaleas are in flower in the parks during March. In the main plaza at Oporto, thousands of tulips are in full bloom at this season.

Coimbra.—The oldest and largest

botanic garden in Portugal is located here. Many plants in the extensive collections are of horticultural interest.

Lisbon area.—Climatically, Lisbon and the area to the west around Sintra, are unlike other areas of southern Europe. Extremes of temperature and aridity are less severe than in comparable areas of the Mediterranean. In summer, cloudy and foggy days are not uncommon in Lisbon, and extreme heat is rare. Frost occurs infrequently. Palms flourish and subtropical plants are commonly grown in parks and gardens in this area. Growing conditions are comparable with parts of southern California.

Lisbon is particularly well-stocked with botanical institutions and gardens of horticultural interest. Three botanical gardens, the city-operated Estufa Fria in Edward VII Park, and a number of small parks are points of major interest within the city. The oldest gardens are about three hundred years old.

The Sierra da Sintra to the west of Lisbon receives perhaps the highest rainfall of any comparable areas of southern Europe. In this mild, wet area, warm temperate and subtropical plants, especially acid-loving species grow luxuriantly. In gardens near Sintra many species are grown to a peak of perfection not attained elsewhere in Europe.

Oporto

Jardim Botânico

The Jardim Botânico at Oporto, established about twenty years ago in collaboration with the Botanical Institute of the University, is the youngest such garden in Portugal. The garden covers about thirty acres, mostly on relatively flat terrain, on the site of an old private estate.

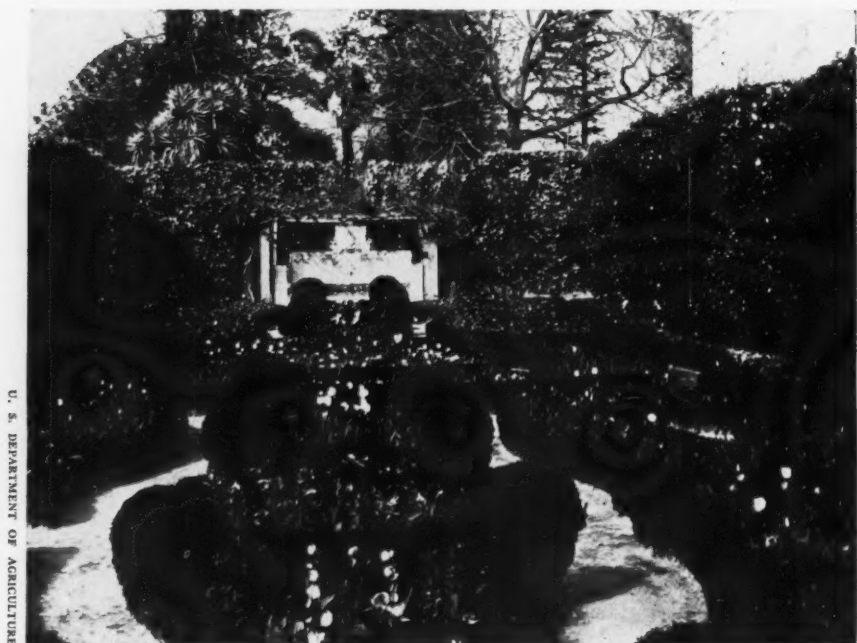
Beech trees, *Fagus sylvatica*, several nearly a hundred feet tall, embellish the grounds around the white-stuccoed building of the Botanical Institute. Hedges of *Camellia japonica*, twenty feet high, surround more formal gardens of clipped boxwood and tulip beds. *C. japonica* 'Mathotiana' is the most outstanding of the cultivars grown as a hedge. A fifteen-foot specimen of *Camellia reticulata* 'Capt. Rawes' is laden with several hundred flowers in March. This



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Twenty-five foot specimen of Mahonia japonica, about a hundred years old, in nursery of Companhia Horticola

*Formal garden surrounded by a twenty-foot hedge of *Camellia japonica* cultivars with clipped boxwood and tulips. Botanical garden, Oporto*



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Nursery of Companhia Horticola built on a series of walled terraces overlooking the Douro River, Oporto



TEOFILO REGO

Camellia japonica trees reputed to be four hundred years old at Villa Nova de Gaia

species grows to perfection in the well-drained sandy acidic soils of Oporto.

Other plants in the Jardim Botânico of special interest include: *Cytisus multiflorus*, a white-flowered Portuguese broom, native of the granitic hills of northeastern Portugal; *Narcissus rupicola*, a dwarf native Portuguese species; *Romulea bulbocodium*, a native species of southern Portugal, with grasslike leaves, and blue flowers not unlike those of a large flowered *Sisyrinchium*.

Companhia Horticola

The Companhia Horticola in Oporto was founded in 1849 and now is the oldest nursery in Portugal. Located on the original site, the nursery overlooks the Rio Douro from a series of broad terraces where the nursery stock is grown. A general selection of high quality nursery stock is offered, including house plants and hardy herbaceous

species, trees, shrubs, fruit trees, and vines.

A monstrous specimen of *Mahonia japonica* is now thirty feet tall with a trunk diameter of eight to ten inches. Hundred-foot ginkgos, *Ginkgo biloba*, date from plantings made nearly a hundred years ago. Camellias are of special interest to the visitor. *Camellia sasanqua* 'Jaune', known also as 'Fortune's Yellow' is yellow only by virtue of the excessive number of petaloid stamens that form a pompon center and yellowish to cream-colored petals, and *C. sasanqua* 'Baronesa de Soutelinho' is a pink-flowered cultivar. *C. japonica* 'Portuense', with yellowish variegated leaves; 'Rainha Santa Isabel', with white flowers; and 'Saudade de Martins Branco', with sanguine flowers, are cultivars of the common camellia of Portuguese origin.



TEOFILO REGO

Tulip tree, Liriodendron tulipifera
Reputably the largest specimen in Europe at the Quinta de Meio

Nursery of Moreira da Silva et Filhos

The nursery of Moreira da Silva et Filhos in Oporto dates from the 1880's. This firm offers a wide selection of high quality nursery stock, especially camellias, evergreens, and greenhouse plants.

Camellia japonica 'Augusto Leal Gouveia Pinto'; 'Doña Herzília de Fretas Magalhaes'; 'Doña Jane Andresen'; 'Dr. Baltazar de Melo'; and 'Duarte de Oliveira'; are cultivars of Portuguese origin grown in this nursery.

Begonia paulensis, an elegant rhizomatous species from Brazil, with pink-veined leaves on a light green background, is grown in some quantity by Mr. de Silva. The waxy-white flowers on two-foot long scapes, are an inch and a half across; the dark red hairs are prominently displayed over the calyx.

Villa Nova de Gaia

Evidence suggests the three old camellia trees at the Villa Nova de Gaia in Oporto are the oldest specimens of *Camellia japonica* in cultivation yet recorded in Europe. The Conde de Campo Bello, present owner of the villa, indicates that living plants of *C. japonica* imported from Japan were planted in the garden about the middle of the sixteenth century. This is not impossible, since early Portuguese traders in the Orient first made contact with Japan in 1542. The discovery of these aged specimens extends the date of introduction of the camellia back nearly two hundred years—to about 1550. Modern reference works date the introduction of *C. japonica* into Europe about 1740.

Two of the three specimens are still in excellent condition, the largest measuring just over two and a half feet in diameter at the base. The specimens are about twenty to twenty-five feet tall. The flowers are single rose-pink. Self-sown seedlings have become established in the vicinity of the mother plants.

Quinta da Meio

The Quinta da Meio, garden of Miss M. R. Tait, overlooks the Atlantic Ocean on a series of broad terraces above the estuary of the Rio Douro. The English-style garden on the old family property was first planted by the Tait grandfather soon after his arrival from Scotland as a permanent resident in Portugal nearly a hundred years ago. Three generations of the family have since nurtured the garden on its present site.

"Bulbous plants" are a special feature of the garden, especially the native Portuguese narcissi. *Narcissus cyclamineus* naturalizes in great profusion in the acidic well-drained sandy soil. *Sparaxis* is abundant in the woodland. A perennial spring that flows through the garden is a natural asset of value in the cultivation of ferns and bog plants. Camellia bushes over eighty years old are twenty feet tall. *Camellia japonica* 'Princeza Real', a pink-flowered formal type, and 'Camurca', with white to blush-pink flowers are cultivars of Portuguese origin. *C. reticulata* 'Capt. Rawes' grows particularly well in this garden. A specimen fifteen feet high is covered with hundreds of flowers in March.

A large specimen of *Liriodendron tulipifera*, now over a hundred feet tall, twenty-two feet in circumference, and seven feet in diameter at the Quinta da Meio is alleged to be the largest tulip-tree in Europe. This tree is now a "Monumento Nacional" as designated by the Portuguese Forestry Department. Tree ferns, *Dicksonia antarctica*, also flourish in the well-watered Tait garden.

North American trees include *Magnolia grandiflora*, fifty feet tall, and *Sassafras albidum*, thirty feet tall. Several old fifteen foot hybrid rhododendrons with deep red flowers, and a double-flowered pink Japanese cherry originally imported from Japan, flower in March. *Eucalyptus ficifolia*, a red-flowered species is thirty feet tall. Thirty-foot specimens of *Ligustrum lucidum* are larger than plants of this species usually seen in cultivation. Several large Judas-trees, *Cercis siliquastrum* in the garden flower at the end of March. A large *Wisteria sinensis* nearly covers one side of the villa.

Coimbra

Jardim Botânico

The botanical garden at Coimbra occupies an imposing site adjoining the University on a hilltop overlooking the valley of the Rio Mondego. Founded in 1772, this is the oldest and largest botanical institution in Portugal. The current plan of the garden dates from the days of Julio Henriques, eminent Portuguese botanist and director of the garden from 1873 to 1918. The garden covers about fifty acres.



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Portion of formal garden and conservatories; Ficus magnolioides in the center is the largest fig tree in the botanical garden, Coimbra

The undulating topography offers a series of varied habitats for the plant collections. Relatively steep slopes drop sharply away from the broad upper terraces into a series of low ridges and valleys below. The collections are planted according to natural botanical relationships. The herbaceous species and many shrubs are grown in beds neatly edged with boxwood on the upper terraces. A collection of palms and conifers is grown in the same area. The bamboo garden covers nearly an acre of ground at the bottom of the valley below the botanical institute. Culms of *Phyllostachys viridis* are approximately forty feet high. Nearby, a succulent collection covers part of the open slopes. A more extensive collection of conifers is planted in the arboretum.

The formal sunken garden in Italo-Portuguese design is one of the conspicuous architectural features of the Jardim Botânico. This garden covers

about two acres adjacent to the conservatories. Specimens of Kwanzan cherry, *Prunus serrulata* 'Kwanzan', the rose 'Belle of Portugal', and ten-foot Japanese sago palms, *Cycas revoluta*, are conspicuous among the woody plants in the sunken garden. Boxwood hedges border the pathways. Two ornamental iron-grill gates give entrance to the garden. A fountain stands in the center. Panels of tiling in the Portuguese taste are conspicuous on the walls that surround the sunken garden on three sides.

The collection of subtropical plants, as one of the most comprehensive in Portugal, includes a good representation of palms, eucalyptus, acacias, figs, and warm-temperate conifers. The greenhouse collection of tropical species is quite extensive.

A specimen of *Ficus magnolioides* about sixty feet high, with a branch spread of equal dimensions is the largest, although not the tallest, tree in the gar-

den. A specimen of *Eucalyptus maculata* var. *citriodora* with a stark-white trunk towers nearly a hundred feet tall. Of the palms, *Washingtonia filifera*, *Arecastrum romanzoffianum*, *Jubaea spectabilis*, and *Erythaea armata*, are thirty to fifty feet high. Specimens of *Araucaria bidwillii* and *A. excelsa* are a hundred feet high.

Hebanthe paniculata, a vigorous climber of the Amaranth Family from Mexico grows rampantly over a pergola. *Apollonias canariensis*, an evergreen thirty-foot tree of the Laurel Family from the Canary Islands is recommended for avenue planting in a mild climate. *Gnidia polystachya* is a six-foot heathlike South African shrub with fragrant yellowish flowers. The latter species is a pretty shrub for a small garden in nearly frostless regions.

Anthurium digitatum, a Colombian species, and *Streptocarpus caulescens*, from tropical East Africa, with small purple flowers one-half to one inch across, are two plants of special interest in the conservatory. The latter very floriferous species grows easily in pots, and high temperatures of a greenhouse are not to its disliking.

Serra de Bussaco

Forest of Bussaco

As a "Monumento Nacional," the Forest of Bussaco is the oldest and most widely known forest preserve of Portugal. Planted by Carmelite monks who founded a monastery on the site in 1268, A.D., the tract covers several thousand acres on the Serra de Bussaco, about forty miles northeast of Coimbra. In those days the monks lived in small cells scattered through the forest, some of which still exist.

The principal introduced trees are the Portuguese cypress, *Cupressus lusitanica*; plane trees, *Platanus* \times *acerifolia* and *P. orientalis*; and Montezuma pine, *Pinus montezumae*. The native Portuguese trees mostly are cluster pine, *Pinus pinaster*; holly oak, *Quercus ilex*; cork oak, *Q. suber*; Portuguese oak, *Q. lusitanica*; and lindens.

One-hundred foot specimens of the Portuguese cypress are among the noblest trees at Bussaco. In many parts of Portugal, this tree assumes the role of a native species. *C. lusitanica* is a native of the mountains near Mexico City and

was introduced to Portugal in the sixteenth century. It was thought to be a native of Portugal by Philip Miller who first assigned the epithet "*lusitanica*" to this plant in the eighth edition of his *Gardener's Dictionary*, published in 1758.

Indeed, *C. lusitanica* not only is very beautiful but also a useful tree. Many cultivated forms exist. Columnar, spreading, weeping, and variegated-leaved types are known. The Portuguese cypress is widely planted, especially in northern Portugal and upland areas of the country. It is seen commonly as a roadside tree, in parks, plantations, and gardens.

The remains of the ancient Carmelite monastery at Bussaco are now incorporated into a manuelian style hotel. A series of formal and informal gardens adjacent to the hotel grounds includes a small collection of camellias. An unnamed cultivar of *Camellia japonica*, is a good white-flowered formal type found growing here. A thirty-foot specimen of *Sophora japonica* 'Pendula' was seen growing at the edge of the camellia garden. In the forest nearby, a valley is planted to *Dicksonia antarctica* and *Cyathea arborea* tree ferns, *Hydrangea macrophylla* 'Hortensia,' and azaleas.

Lisbon

Ajuda Park—The original park is now composed of two main parts:

1. The Royal Park

Lisbon's Royal Park of Ajuda and the surrounding gardens were established under Royal patronage by D. João (1644-46). The most interesting horticultural features center around a well-kept formal garden in Italo-Portuguese design and a collection of old trees. Some of the specimens were planted nearly three-hundred years ago.

The formal gardens overlook the estuary of the Tagus River on a series of broad terraces. Pelargoniums and cannas planted between long double and triple rows of clipped hedges of boxwood reflect the Portuguese taste for flowering plants.

A large dragon's blood tree, *Dracaena draco*, fifteen to twenty feet tall with a branch spread of over forty feet, rivals in size some of the oldest recorded specimens of this species in the Canary Islands where it is a native plant. Other trees of special interest are: *Sophora*



U. S. DEPARTMENT OF AGRICULTURE

Formal gardens of the Royal Park of Ajuda with pink and red pelargoniums and dwarf cannas planted between double and triple rows of clipped boxwood hedge. Washingtonia filifera palms, and the Tagus estuary beyond.



U. S. DEPARTMENT OF AGRICULTURE

Dragon Tree, Dracaena draco, nearly forty feet across was planted in the seventeenth century



U. S. DEPARTMENT OF AGRICULTURE

Sophora japonica 'Pendula', a weeping form of the Japan Pagoda Tree

japonica 'Pendula', twenty-five feet tall; *Fagus sylvatica* 'Tortuosa', forty feet tall; *Acacia armata*, thirty feet tall; and *Schotia latifolia* from South Africa with a branch spread of nearly fifty feet at the base. In the formal garden specimens of the Mexican *Nolina longifolia* are ten feet tall. Specimens of *Grevillea robusta* are nearly seventy feet tall.

A fern, *Microlepia strigosa* 'Cristata' in the greenhouse of the Royal Park is of much decorative merit. The tips of the lax foot-long fronds are crested.

2. The Botanical Park

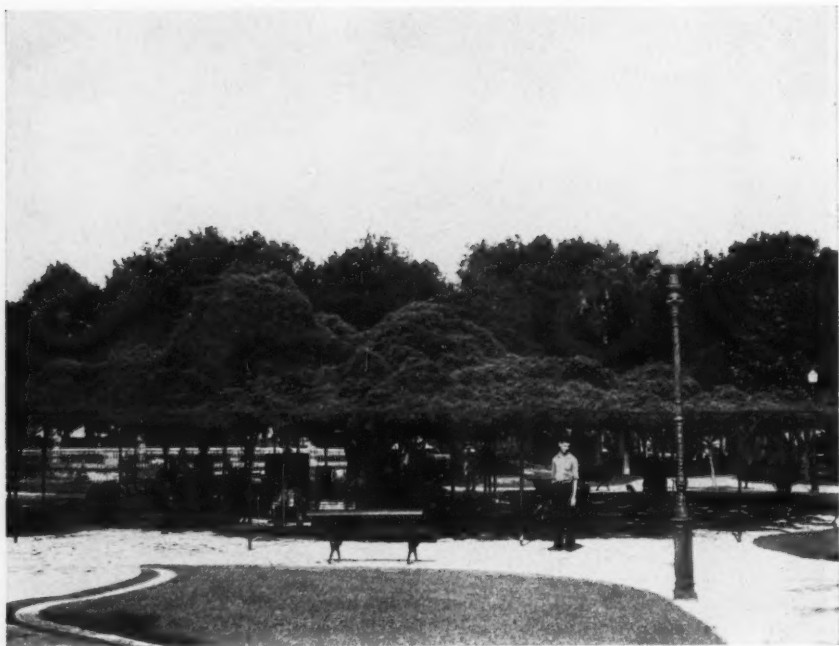
The Botanical Park of Ajuda covers more than one-hundred acres on the grounds of the Institute of Agronomy. The activities of the garden concern plant introduction and acclimatization studies on ornamentals and economic crop plants of special interest to Portuguese agriculture and horticulture. The botanical garden has developed largely over the past thirty to forty years on a

site formerly a part of the nearby Royal Park of Ajuda described previously.

The exotic plants include subtropical trees, shrubs, and herbaceous species hardy in the Mediterranean climate of Lisbon. The old trees in the woodland, chiefly Portuguese cypress, *Cupressus lusitanica*, and the holly oak, *Quercus ilex*, were planted about two-hundred years ago.

Olea europaea 'Sylvatica', represented by a forty-foot specimen in the Botanical Park manifestly makes a superior tree for ornamental purposes as compared with the common commercial olive. The cultivar 'Sylvatica' differs from the common olive in the straighter bole, more densely branched round crown and larger size of the tree.

The economic collections consist of forage and oil crop species and an extensive collection of fruits—fig, pear, plum, peach, cherry, and grape cultivars grown in Portugal.



U. S. DEPARTMENT OF AGRICULTURE

Weeping form of the Portuguese cypress, Cupressus lusitanica 'Pendula', nearly fifty feet across, supported on a metal frame in a small public park of Lisbon.

Jardim do Ultramar

As a public botanical garden and research institution combined, the Jardim do Ultramar functions in the interest of agricultural problems related to the Portuguese overseas territories. Located in Belem, a western suburb of Lisbon, the Overseas Garden covers about fifty acres overlooking the estuary of the Tagus River. Research activities encompass a wide range of studies on crop plants related to tropical agriculture—rice, sugarcane, sesame, coffee, and cotton.

The principal features of the garden include a long avenue of sixty-foot California fan palms *Washingtonia filifera*, that extend from the entrance to the center of the garden; an aquatic garden near the entrance; a conservatory for tropical plants; and an arboretum. A section dedicated to the Portuguese

colony of Mação is devoted chiefly to bamboos. The most interesting ornamental plants are tropical and subtropical species, especially those from the Portuguese African territories.

Trees of special interest: *Podocarpus mannii*, a conifer from the tropical island of São Thomé; *Dombeya burgessiae*, from Mozambique with pink flowers; and *Erythrina corallodendron*, with scarlet flowers. A twenty-five foot specimen of *Oreopanax capitatus* is the only example of this ornamental species seen in Portugal. This tree is widely grown on French and Italian Riviera.

Collections of ornamental merit in the conservatory include *Treculia africana*, the African breadfruit tree; *Saraca indica*, the "Sorrowless Tree" of India—the tree under which Buddha is said to have been born; *Goethea strictiflora*, an attractive large shrub related to *Pavonia*



U. S. DEPARTMENT OF AGRICULTURE

Garden gate dedicated to the Portuguese colony of Mação in the Colonial Garden, Lisbon

of the Mallow Family with cauliflorous red flowers; *Rheedia macrophylla*, an evergreen tree native of Brazil; *Memecylon mannii*, a shrubby species of the Melastome Family from west tropical Africa.

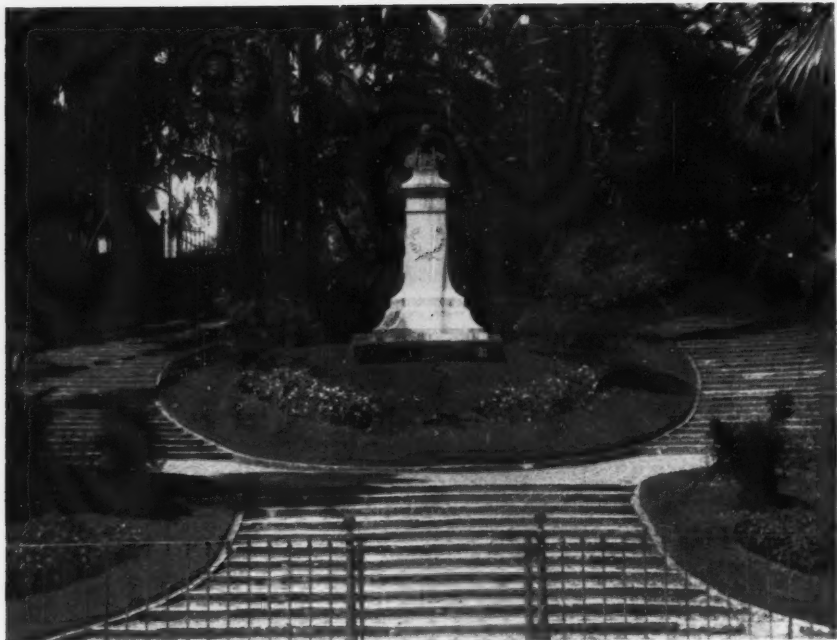
Estufa Fria

The Estufa Fria, in Lisbon's Edward VII Park, is known among the more unusual horticultural attractions of southern Europe. This lath house "conservatory" is without artificial heat and covers nearly two acres. Many tender tropical plants that otherwise would not thrive without protection are grown in the Estufa Fria.

A rock embankment on one side provides a natural habitat for growing subtropical vines, ferns, begonias, saint-paulias, aroids, and other species that prefer the environment of a humid tropical forest. Clambering lianas are plant-

ed on concrete pillars made to simulate tree trunks that support the superstructure of the Estufa Fria. Tree ferns, mainly *Dicksonia antarctica* and *Cyathea arborea*, and the palms *Livistona*, *Howeia*, and *Chamaedorea* contribute to the jungle habitat of the cold greenhouse.

Begonias are much-planted in the Estufa Fria, especially the rex types. *Begonia maxima*, with pink flowers, is a rarely cultivated woody species four feet tall. Fuchsias are grown in baskets throughout the lath house. *Crinum giganteum* of the bulbous plants that tolerate shade is abundantly planted. *Chrysophyllum imperiale* is an elegant Brazilian tree with leaves lustrous green on the upper surface and silvery beneath. The aroid, *Epipremum giganteum*, a giant species from Malaya, contributes much to the tropical character of the Estufa Fria.



In the botanical garden, Lisbon

Jardim Botânico

The Jardim Botânico occupies a pleasant setting near the center of the city, on one of Lisbon's seven hills. The garden, as the second oldest botanical garden in Portugal, was founded in 1839. Subtropical plants flourish in a warm-temperate climate not unlike that of Los Angeles. Although founded primarily as a center for the study of botany, the garden is full of well-grown plants of much interest to both layman and scientist.

C. Vasconcellos and A. Franco [*As Palmeiras de Lisboa e Arredores*. In *Portugaliae Acta Biologica*. 2: 289-425. 1948.], in their paper on the palms of Lisbon and vicinity, record twenty-four genera and nearly forty species of palms growing in this area. The collection in the Jardim Botânico ranks among the most comprehensive in Portugal. A fine double row of California fan palms, *Washingtonia filifera*, borders the long avenue leading into the garden from the west entrance. The hesper palm, *Erythaea armata*, thirty feet tall, frames the entrance to the conservatory. The white, fifteen-foot long inflorescences of the latter species are particularly attractive when produced in midsummer. *Eleutheropetalum sartorii* var. *confertum*, *Archontophoenix alexandrae* var. *bea-*

tricae, and *Phoenix canariensis* var. *porphyrococca* are represented among the rarer palms in the collection.

Other attractive plants in the Jardim Botânico include: *Ruellia ciliatiflora*, an attractive two-foot herbaceous perennial from Argentina with purple flowers nearly two inches across; *Cestrum fasciculatum*, a good color form of this attractive Mexican species with deep rose-colored flowers; and *Limoniastrum monopetale*, an extremely attractive and very floriferous seaside shrub (recommended for planting along the sea in California). In midsummer, this native Portuguese relative of the common thrift, *Armeria*, is laden with rose-violet flowers on the branch tips.

Strobilanthes kunthianum is an interesting evergreen shrub from the Nilgiri hills of south India; and *Lycium afrum* is a spinescent shrub from South Africa with yellow fruit an inch across. *Hedychium gardnerianum*, an Indian species with yellow flowers, is one of the most beautiful of the cultivated members of the genus. The latter species has naturalized in moist locations in the Jardim Botânico. *Semele androgyna*, the climbing butchersbroom, grows luxuriantly on the trunks along the avenue of Canary Island date palms, *Phoenix canariensis*. The Brazilian soap-bark tree,



FREDERICK G. MEYER

Parque de Monserrate, Sintra. Thuja orientalis in foreground; Araucaria bidwillii, the bunya-bunya tree in upper right.

Quillaja brasiliensis, in fruit during August, is the rarer of the two cultivated species of the genus. A specimen of the floss-silk tree, *Chorisia speciosa*, from Brazil, now nearly one hundred feet tall, with a crown spread of over fifty feet, may be the largest of its kind in Europe. *Quisqualis indica*, with flowers that open white in the morning and change to red as the day advances, is one of the most beautiful of the tropical climbers grown in the Jardim Botânico.

A collection of cycads includes *Dioon spinulosum*, *D. edule*, *Cycas revoluta*, *C. circinalis*, *Zamia floridana*, a staminate plant of *Stangeria paradoxa*, and species of *Encephalartos*.

Serra da Sintra

About forty miles west of Lisbon, a low range of hills, the Serra da Sintra, parallels the Atlantic coast for about ten miles from Sintra to Cape Roca. The highest elevation is 1,736 feet. The terrain is relatively rugged and the slopes are densely forested. Within this limited area, the moisture-laden winds bring an evenly distributed and more copious precipitation than for any comparable region of coastal Portugal. The windward slopes of the serra are frequently swathed in mist and fog. Frost is rare.

Two gardens, the Parque de Monserrate and the Parque da Pena, located near Sintra, are unique among the gar-

dens of Portugal. The equable climate and the sandy acid soil are favorable in this area for growing conifers, ericads, camellias, and a host of warm-temperate and subtropical plants to a peak of perfection not usually found in the gardens of southern Europe. Tree ferns, for example, grow to a height of fifty feet.

Parque de Monserrate

The Parque de Monserrate covers about seventy-five acres on a series of wooded ridges and valleys typical of the sharply undulating windward slopes of the Serra da Sintra. Monserrate was developed through the efforts of one, Sir Francis Cook, a long-time British resident of Portugal. The garden is now about a hundred years old. Foggy summers, an evenly distributed rainfall throughout the year, and rare frosts favor the cultivation of warm-temperate and subtropical species. Conifers, tree ferns, and palms are of particular interest.

The most interesting conifers are species from the Southern Hemisphere. A magnificent specimen of the Australian dammara pine, *Agathis robusta*, is now over eighty feet tall and more than four feet in diameter. Nowhere in Europe is this tree cultivated so successfully. Beautifully developed specimens of *Araucaria bidwillii*, the bunya-bunya tree of Australia, are nearly a hundred feet tall. Norfolk Island pines, *Araucaria excelsa*, are a hundred feet tall and five feet in

diameter. *Dacrydium cupressinum*, the rimu tree of New Zealand with extremely beautiful weeping branchlets is forty feet tall. *Cryptomeria japonica* of Japan reaches one hundred and twenty-five feet in height at Monserrate.

Magnolia grandiflora trees, fifty feet tall, are the largest specimens encountered in Mediterranean gardens. *Photinia serrulata* is seventy-five feet tall with a trunk diameter of a foot. In the United States many growers know this Chinese evergreen species as a bush six to eight feet tall.

A forest of tree ferns is one of the most impressive of the plantings at Monserrate. *Cyathea* sp. ten to thirty feet tall, and *Dicksonia antarctica* ten to twelve feet tall, flourish with the vigor of specimens in their native Australian habitat. *Grevillea robusta*, the Australian silk-oak tree, is a hundred feet tall. *Trichilia* sp. of the Tree-of-Heaven family, is an attractive thirty-foot tall evergreen tree with pinnately divided leaves and orange-colored fruit. *Roupala pohlii*, a highly attractive species related to the silk-oak tree (Proteaceae) from Brazil, is represented by small specimens twenty feet tall. Rhododendrons have naturalized in various parts of the garden. *Cornus capitata*, the evergreen dogwood, is represented by a 15-foot specimen.

Of the herbaceous plants, *Hedychium gardnerianum*, an elegant yellow-flowered species from India, has naturalized along the small watercourse that flows through the valley below the Manuelian-style mansion house. *Gunnera* sp. with gigantic leaves three feet across is a companion plant of the hedychium.

About twenty-five species of palms are growing at Monserrate. *Diplothemium arenarium* and *Trithrinax acanthocoma* are the rarest in the collection. Large specimens of *Livistona australis* are nearly sixty feet tall. *L. chinensis* is thirty feet tall. *Howea forsteriana* and *H. belmoreana* are nearly fifty feet tall. Several specimens of *Archontophoenix cunninghamiana* are approaching fifty feet tall.

This is one of the most pleasant and favorable sites for a garden encountered by the writer in southern Europe. The property now is administered through the local municipality and visitors are freely admitted upon payment of a small fee.

Parque da Pena

Under Royal patronage, planting of forest trees at the Parque da Pena began about a hundred years ago. In the moist, nearly frostless climate of the Serra da Sintra, few arboreta are more favorably located for growing trees from moist, warm-temperate climates. On several hundred acres trees of potential value to Portuguese forestry are grown. Species from Australia, New Zealand, Chile, Japan, Tasmania, New Caledonia, and North America predominate among the plantings.

Conifers are widely represented in the collection. Of special interest are species from the Southern Hemisphere. Specimens of *Callitris cupressiformis* from southeastern Australia and *C. tasmanica* from Tasmania, are fifty feet tall. *Dacrydium cupressinum*, about fifty feet tall with beautiful pendulous branches and dark green rattailike branchlets is a New Zealand species. *Araucaria heterophylla* and *A. montana* from New Caledonia are rarely grown species of monkeypuzzle in the collection. Specimens of *Agathis robusta*, the Australia dammara pine of Queensland, are now about two feet in diameter.

Two conifers of the Northern Hemisphere, *Abies* \times *vasconcellosiana*, a hybrid of *A. pindrow* \times *A. pinsapo*, and *Podocarpus neriifolia* 'Variegatus', a variegated-leaved form, originated at the Parque da Pena.

Australian species of *Acacia*, especially *A. dealbata* and *A. stricta*, are naturalized in many parts of the Parque da Pena. *Banksia integrifolia*, an Australian species of Proteaceae, is self-sown from mature fifty-foot trees. *Pittosporum* has naturalized in some areas, especially *P. huttonianum* and *P. undulatum*. A valley devoted to *Dicksonia* and *Cyathea* tree ferns could well represent a scene from parts of Australia or New Zealand. A fifty-foot specimen of *Clethra arborea*, native of Madeira, flowers in August and is one of the most striking of flowering trees in the collection. *C. brasiliensis*, a Brazilian clethra with thick leathery leaves four to five inches long, was not yet in flower.

Management of the collection comes under the Portuguese Forestry Department of the Institute of Agronomy in Lisbon.

Biennial Campanulas

ROBERT M. SENIOR*

Some of the most beautiful campanulas, many of them seldom seen in our gardens, are included among those that are biennial. No doubt the "Canterbury Bell" is the most frequently grown.

Strictly speaking, a biennial is a plant that develops vegetatively the first year, blooms and sets seed the second year, and then dies. There are occasionally some that grow vegetatively for two years or even longer, however, then bloom and die. For example, we have raised one of the most charming campanulas, *C. mirabilis*, which almost invariably did not bloom until the third or fourth year.

Nearly all these so-called biennials are not difficult to grow, requiring only a light well-drained soil, and possibly, in summer, some shade during midday. A few of them cannot withstand our winters, with alternate freezing and thawing weather. These are particularly suitable for the alpine house. Those grown outdoors that have rather thick downy leaves should be protected in winter with a pane of glass over them, or better still, placed in the coldframe, where the leaves can be kept absolutely dry. One good feature of these plants is that they set seed freely, and if these are sown when they are still reasonably fresh, they germinate readily. In fact, one single pod will often contain more seeds than the average gardener would care to sow.

One of our favorite flowers, a native of Yugoslavia, is *C. formanekiana*, which is usually a little over a foot high. The first year it forms an attractive rosette of rather downy lyrate leaves. With us it generally blooms the third year, when it sends up a shoot bearing a considerable number of erect large white bell-shaped flowers, blooming rather close to the stem. Although we have occasionally kept a plant in the coldframe over the winter, it is really at its best in the alpine

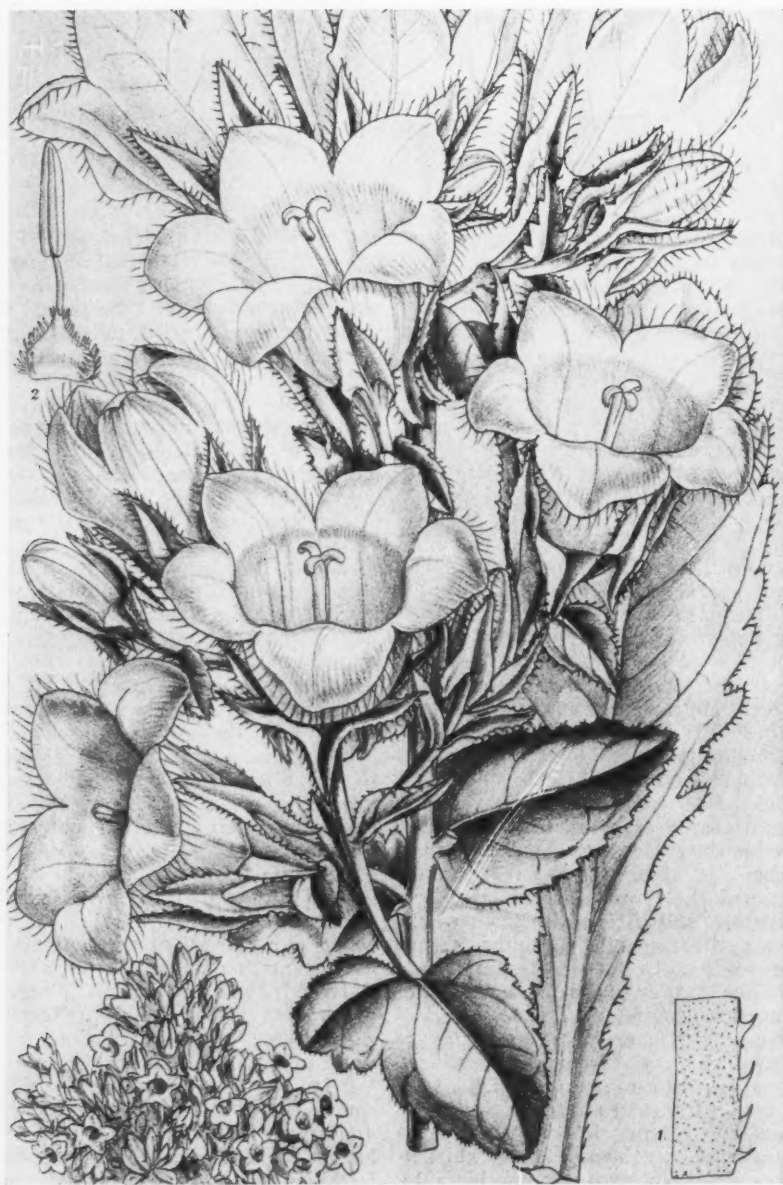
house, where it has a fairly long period of bloom during the latter half of June and early July. It has a long taproot, so after the first year it should be placed in a rather deep pot. Incidentally, a number of years ago, the Royal Horticultural Society gave it an "Award of Merit."

Probably many people who have visited the Alps in summer have seen the delightful *C. barbata*, which gets its name from the fringe of hairs along the edge of the drooping lavender-blue bell-shaped corolla. It is said to be perennial, but with us it always dies after blooming. We have raised it on several occasions, placed in a rock crevice, where it could send its taproot down for a considerable distance. Here, too, the plant seeds freely. Possibly in our climate it does best in a northern exposure, or at least in a position where it gets some protection from the midday sun in summer.

There are several species that are native to Greece, all of them having attractive lyrate basal leaves. When the profusely-flowering stems finally arise, these basal leaves die, or at least most of them do. Among this group is *C. andrewsii*, *C. pelia*, *C. celsii*, *C. anchusiflora*, and *C. rupestris*. At different times we have raised all of these plants. All have somewhat downy leaves, and possibly with the exception of *C. rupestris*, are safer to raise in the alpine house. In a coldframe, however, and kept as dry as possible, they often survive the winter.

I believe there is only one biennial that is native to this country, namely *C. americana*. This plant, not particularly attractive, usually over one and one-half feet high, is found over a great part of the eastern section of this country, ranging from Canada to Florida. Here in southern Ohio, it is rather widespread, usually growing in thin woods. It has violet-colored, wheel-shaped flowers, arranged in spikes. One characteristic is its long curved style. If you have seeds of this plant, and scatter them in your wild garden, some are almost certain to germinate. Since the plant sets seed

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G. HAMPELER

Campanula mirabilis photographed from Curtis's Botanical Magazine,
Vol. 126, T.7714.

ROBERT M. SENIOR

ROBERT M. SENIOR



Campanula andrewsii

(the first year)

(the second year or third year)

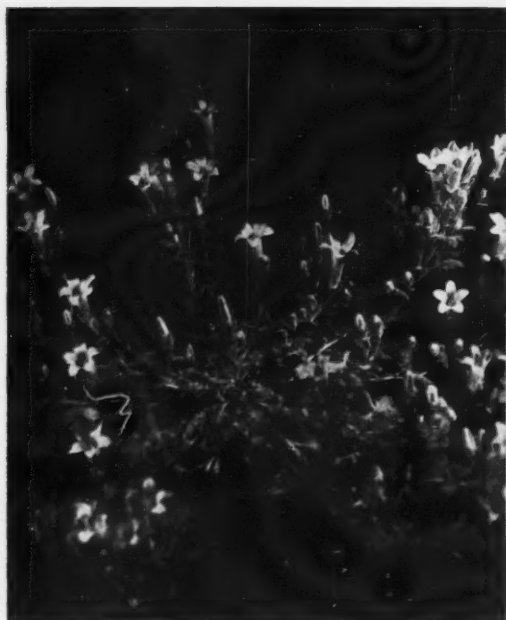
Campanula formanekiane

Campanula incurva



ROBERT M. SENIOR

ROBERT M. SENIOR

*Campanula pelia**Campanula rupestris*

freely, seedlings would probably appear year after year.

C. incurva is another Grecian species, sometimes incorrectly called *C. leutweinii*. The first year it forms a rosette of ovate cordate leaves, of a rather yellowish green hue. In the course of time it sends up erect stems and side shoots, the main stem about fifteen inches high, all bearing large upright white flowers, which may be as much as two inches long. It is said that the flower is sometimes of a light lavender color, but the flowers of our plant have always been white. Here again, it is safest to carry it over the winter in the coldframe or the alpine house.

C. sartori is found on certain islands of the Mediterranean. Like so many of these biennials and monocarps, it first forms a rosette of small, rather round dentate leaves. In due time it sends out shoots that are practically prostrate, bearing numerous erect white flowers. There is a delicate charm to this species, which induces us to raise a few of them year after year. In fact, we bought seeds about fifteen years ago, and our present plants are all descendants of those that we originally raised.

Of all the plants mentioned, *C. mirabilis*, native to the Caucasus, is one of the most beautiful. We raised it on several occasions; unfortunately it never bloomed in less than three years. It is

said that by spraying a plant of the "Canterbury Bell" with gibberellin it has often been made to bloom the first year, and we are wondering whether the use of this chemical would hasten the bloom of *C. mirabilis*. If this treatment were to prove effective, the popularity of this plant would be greatly enhanced. At any rate, our plant, the first year, developed a rather large rosette of dark green, shiny leaves. When flowering time arrived, it threw up a stem about fourteen inches high, with short side branches bearing numerous, large, erect bell-shaped flowers, up to two inches long, and almost as wide, of a pale lilac-blue color. We once raised it on a slope in the rock garden, placed in a rock crevice, where it received some protection from the midday sun, and here, in the third year, it bloomed profusely. It is an ideal plant for the alpine house. Incidentally, the English *Dictionary of Gardening* has a picture of the plant; it is also illustrated in *Curtis's Botanical Magazine* table 7714.

There are a number of other biennials, among which are *C. patula*, a rather widespread species in central and southern Europe, *C. reiseri*, another floriferous Grecian one, and *C. longistyla* from the Caucasus. These plants are worth growing, but hardly as attractive as most of those that we have described.

A Book or Two

The Beginning Gardener.

Katherine N. Cutler. M. Barrows and Company, Inc., 425 Fourth Avenue, New York 16, New York. 1961. 173 pages. Illustrated. \$2.95. (Library)

This is a book written for small children to introduce them to gardening. It is written so that children of the elementary grades can understand. Several kinds of gardens are suggested such as one in a box or dish, an herb garden, window garden or a wild flower garden. Simply written chapters are short so as to continue the child's interest. Several phases of gardening are included as telling about soil, how plants are grown, making a compost, digging and cultivating, garden tools, and general care. The culture of more common vegetables and flowers is described briefly. This would be a good book for fourth or fifth grade children to read when they want to do a project for the school science fair or a school exhibit.

CONRAD B. LINK

The Hydrangeas.

Michael Haworth-Booth. Constable and Company, Limited, 10 Orange Street, London W. C. 2, England; distributed by Charles T. Branford Company, 75 Union Street, Newton Centre 59, Massachusetts. 1959, Third Edition. 185 pages, plus Illustrations. \$5.00. (Library)

This appraisal of the hydrangea is a revision of an earlier edition of this English work and covers the history, species, culture, etc., in a solid fashion. In many respects it reads like E. H. Wilson, and Wilson's findings are generously referred to in relation to history and plant collecting. Like many English writers, Mr. Haworth-Booth chooses to overlook the efforts made in the U. S. from a horticultural standpoint. In the area of plant introduction he proposes that there is a need to collect the "fruits of a great ornamental gardening tradition," i.e., Japan. This is something we have been doing ever since Perry's expedition to Japan and in the last several years, American horticulturists have paid great attention to Japanese horticulture.

Despite such seeming shortcomings, the book is well organized and done with authority. If AHS Members wish a knowledge of the fundamentals of the hydrangea this will well serve. From the standpoint of use, culture, and treatment as plants for American gardens there is much to be desired.

J. L. C.

The Lawn Book.

Robert W. Schery. The Macmillan Company, 60 Fifth Avenue, New York 11, New York. 1961. 207 pages. Illustrated. \$5.95. (Library)

This is a useful small volume in which are discussed nearly every element needed even for the layman to undertake an intelligent preparation of whatever area he may desire to plant as a lawn. The most interesting "new" treatment is the addition at the end of each chapter of a short section called More Fancy Than Fact. In it are discussed and disposed of certain common ideas that are not true.

If any criticism can be offered, it might appear to be of the discussions of areas other than the greater central and northern portions of the country, where the establishment of good lawns is more difficult, for reasons of soil or climate. The weed lists are interesting and the drawings that accompany the notes and comments are clear enough. The only region familiar to the reviewer boasts a considerable number of lawn weeds that are not mentioned, including a delightful annual known as soliva, and a perennial species of erigeron that rivals *Salvia lyrata* in persistence and spread.

The discussion of centipede grass is inadequate. In other writing, this author speaks of it as a "prima donna," which is a slander. It has no difficulties, no diseases, and shows no faults save two: in continued rainy weather in shade, it may appear chlorotic, but that passes as soon as the rain lets up; and in areas where there is constant walking, paths will appear, but the plants do not die. For sandy soils in the South, this is a grass that all lawn men had better heed.

B. Y. M.

Holiday and Party Table Settings.

Zelda Wyatt Schulke. Hearthside Press, Inc., 118 East 28th Street, New York 16, New York. 121 pages. Illustrated. \$4.50. (Library)

This is a book of easy reading. Many of the pages are taken up with pictures and descriptions of them, but there is basic information. This covers table setting and appointments and is given in a practical way. Most of the pictures feature easy to obtain materials. The exhibitor as well as the busy housewife should find this helpful for formal or informal entertaining.

ANNE W. WOOD

(Books available **for loan** to the Membership are designated: (Library). Those not so designated are in private collections and are not available for loan. Books available **for sale** to the Membership are designated with the special reduced price and are subject to the usual change of price without notice. Orders must be sent through the American Horticultural Society accompanied by the proper payment. Please allow two to three weeks for delivery. Those not designated for sale to the Membership at reduced prices can be purchased through the Society, however, at the retail prices given. In these instances the full profit is received by the Society to be used for increased services and benefits of the Membership.)

Arranging Flowers for the Sanctuary.

Francis Patteson-Knight and Margaret McReynolds St. Claire. Harper & Brothers, Publishers, 49 East 33rd Street, New York 16, New York. 1961. xii + 132 pages. Illustrated. \$3.50. (Library)

This is a most interesting book. It is not primarily about arrangements, as such, but about arrangements in the Sanctuary, and do not ever forget that as you read. It immediately relieves the authors from a great variety of problems, even if it presents others peculiar to its field.

What impresses this reviewer more than anything else is the sense of organization that is apparent throughout the book, with some inclusions that surprise one and some omissions that seem odd. The word, sanctuary, is relegated to the glossary, presumably on the assumption that any who need the book will know all that that word bears historically and otherwise.

The treatment of arrangements is shown to be controlled, and very properly so, by several factors: the denomination, the architectural style of the building, the season of the year, the special occasion, as for Christmas or a wedding, the material available to workers, according to budget and climate, and to certain styles.

If one single element were to be marked for special praise, it is that a sense of scale is shown to be the primary test of any successful arrangement in this usage. Many an arrangement, fine in itself, can be out of scale for the edifice or the position where it is to stand, and be further wrecked by choice of materials that are not sufficiently dominant in character for the place.

The next most important inclusion in the book is that which discusses all the things that have nothing to do with flower arrangement as such—Altars, Lights, Vestments, and the Cross where that is used. Every one of these impinges upon the proper placement and style of arrangement of flowers or foliage, and of the colors involved. Basically, if decorations are used, they must be subservient to all these elements, and this is made clear.

There are many practical details, of value particularly to such persons as have charge of the placement of decorations from plant materials in any church.

There is a chapter devoted to "The Christian Calendar," but it is a calendar based on the observances of the Episcopal and the Roman Church, not the many Protestant churches that ignore it, in large part; but this is supplemented by a Calendar for the Jewish Year, which is not as the other. This same chapter goes on to list plants available by colors and by seasons, with an additional discussion of floral symbolism, much of which seems rather irrelevant, and many of the plants included could not possibly be used in any church decoration of size, and be seen five feet away.

The illustrations in halftone are centered in the book, and show a catholic taste in choice among a variety of churches, denominations and architectural styles, followed by an interesting group of individual arrangements, some quite stunning, and some by themselves of no interest, but with every potential when placed correctly.

Some extraneous lists, and a list of titles of many years coverage in the total field.

B. Y. M.

Getting Started With Rhododendrons and Azaleas.

J. Harold Clarke, Doubleday and Company, Inc., 575 Madison Avenue, New York 22, New York. 268 pages. Illustrated. \$4.95. (Library)

This book on these two popular groups of ornamental plants is directed to experienced gardeners, but to a selected group of them; those who have had little experience with rhododendrons and azaleas.

Parts One and Two are primarily devoted to the culture of these plants and are well done for this selected audience. Part Three would seem to go beyond the stated purpose and reaches into the field of the specialist. Particularly is this true in the later chapters of Part Three, when species and variety lists are presented and breeding techniques are discussed. Much of the text, while valuable for the advanced amateur, is far beyond the needs of the beginner and scope of the title.

Chapters on the climate and soil requirements of these acid-loving plants on uses, culture, care, and pests are quite appropriate and are concise, interesting and very informative.

The author goes too far, however, in the list and description of species and varieties for use in the experienced amateur's garden. So many possibilities are offered that the newcomer in this group will be completely confused. Many of the varieties recommended would not be hardy in some major sections of the country where these plants are particularly popular. The list is by-and-large a suitable list for the West Coast area where the author has had his major experience. Only 25 out of the 100 varieties listed (including 10 which the author calls "the old hardy hybrids") are varieties hardy in zones One and Two as established by the American Rhododendron Society.

The final chapter on planting lists for special places and purposes will be helpful to the group to which the book is directed.

It is unfortunate that a great majority of the illustrations do not add to the value of the book. They certainly do an injustice to the real value of the text. Particularly this reviewer would lament the inclusion of some of the illustrations on "Uses" and most of those supposed to illustrate the flower characteristics of individual flower trusses. Better illustrations would have enhanced the value of the written word.

R. P. WHITE

Japanese Flower Arrangement in a Nutshell.

Ellen Gordon Allen. Charles E. Tuttle Company, Rutland, Vermont, and Tokyo, Japan. 1960 (Tenth Printing). 55 pages. Illustrated. \$1.00. (Library)

This paper-bound book is an inspiring coverage of principles and technique aimed at stimulating interest in Ikebana. It is a handbook for beginners and advanced students as well.

Mrs. Allen defines symbolism in general and the meaning of the famous Japanese word "furu." With photographs and drawings she shows how special talent is not necessary to do a Japanese arrangement. She proves art principles are revealed by nature, based on certain rules as an approach to symmetry, imparting graceful and harmonious curves to the tri-linear flower arrangement.

HEATHERLY D. ABERNATHY

Forest and Shade Tree Entomology.

Roger F. Anderson. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, New York. 1960. 428 pages. Illustrated. \$8.50. (Library).

Professor Roger F. Anderson of the School of Forestry, Duke University, has written an informative book about the insects that attack forest trees and wood products. In the first section (83 pp.) structure, physiology, classification, abundance, insecticides, and principles and methods of control are considered. The major part of the book (Section 2) is devoted to discussion of the individual species that damage forest and shade trees and wood in use.

Illustrations (black-and-white) are numerous and very good. The book is both a reference text and manual.

C. M.

Principles of Plant Breeding.

R. W. Allard. John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, New York. 1960. 485 pages. Illustrated. \$9.00. (Library)

The content of most plant breeding texts has tended to be unduly weighted in the direction of the author's personal area of interest. Genetics and population studies have been dealt with separately from plant breeding methods as though the latter were not completely dependent upon the former.

"Principles of Plant Breeding" is a new and welcome type of text in which emphasis is placed on the genetical basis of plant breeding methods and in which these methods are illustrated with work from a great variety of crop plants. The usual dull reading has been replaced by material logically developed and interestingly written. Each section is complete in itself, allowing the instructor to suit the book to his course needs. This is an excellent text for students of plant breeding.

The layman without genetical training will find many sections difficult, as a basic knowledge of that subject is assumed. Conspicuous by their absence are the methods and applications of experimental design; an omission for which this reviewer is grateful. Too many plant breeding texts have blunted the interest of even the most avid beginning student by interspersing otherwise intriguing sections with the language of biometry—a subject better left to the required special courses.

R. W. LIGHTY

Bonsai. Japanese Miniature Trees. Their Style, Cultivation and Training.

Kan Yashiroda. Charles T. Branford Company, 75 Union Street, Newton Centre 59, Massachusetts. 1960. 166 pages, plus 48 pages of 117 illustrations. \$5.75. (Library)

Whether the American mind and eye will ever attain the depths of perception that has been built into the Japanese concept of plants and man is a debatable point. But with the trend to grasp at the symbols of the intimate relationship the Japanese have with plants, Americans should now become experts in the culture of Bonsai. Because these creations are difficult to import successfully due to various quarantines, the only answer is to undertake the culture here at home.

Mr. Yashiroda has written a book which gives the details of Bonsai culture in exacting fashion. In addition, he has quietly slipped in a few concepts that will be enjoyed, such as the expression of delight and humor in the growth of Mame Bonsai (Miniature Bonsai) from seed. There are no technical faults to the book, plant names are properly designated and there are ample line drawings to simplify the text. AHS members who do not particularly care to engage in the art of Bonsai will still find this a book well worth having in their library.

J. L. C.

Tropical and Subtropical Agriculture.

J. J. Ochse, M. J. Soule, Jr., M. J. Dijkman, and C. Wehlburg. The Macmillan Company, 60 Fifth Avenue, New York 11, New York. 1961. 1446 pages, in two volumes, boxed. Illustrated. \$35.00. (Library)

This is a magnificent work, long needed and of singular value not only in the Tropics themselves, but to persons working within the United States and those sent from here to other countries. It is quite impossible of review.

There is an imposing list of acknowledgments, of references and of data reproduced from other works, most of them not easily available to workers in this country. The authors, who modestly write of themselves as writers, are an imposing quartette, each with his own special type of contribution.

The book is divided into two major portions, the first dealing with general topics, such as climate and physiology, formation of soil, chemical and physical properties of soil and organic matter, soil fertility, soil management, and cultural practices, crop improvement, economic considerations, and food value of tropical products. These topics may read as if dull going, but that is not the case, and the contents are splendid and basic.

Part Two deals with crops, and the arrangement is based on those that are of paramount importance in our present economy and then follows a long treatment of the other tropical crops that are or may be of importance in varying degrees. These are arranged according to orders, so that one reads of all the Annonaceae species in one section, and is reminded that

there are many, aside from the delicious cherimoya that does sometimes reach a northern market, even if not in its best state. Volume Two continues this treatment and then passes to discussions of crops according to the product as Spices, Beverages, etc.

There is an excellent glossary, author index, subject index, and index of common names.

This sort of review cannot begin to indicate the degree of care that has gone in to the preparation of every section—in fact, of every subject. The work is monumental and should be final for any foreseeable future.

B. Y. M.

Flora Malesiana.

Vol. 1. Malaysian Plant Collectors and Collections. By Mrs. M. J. Van Steenis-Kruseman. Introductory chapters by Dr. C. G. G. J. Van Steenis, general editor. Published under auspices of Botanic Gardens of Indonesia, Bogor, and of the Rijksherbarium, Leyden, Netherlands. Published by Noordhoff-Kolff N. V., Djakarta, Indonesia, 1950. Large octavo, 791 pages. 3 maps, 200 illustrations. Bound in vermin-proof cloth. \$23.50.

Vol. 2 (in preparation). To consist of an illustrated account of the vegetation of Malaya.

Vol. 3 (in preparation). To be a detailed discussion of the plant-geography.

Vol. 4. Introductory chapters on importance of variability of Malaysian plants (70 pages), history of Malaysian phytography (90 pages), dates of publication of Malaysian species (60 pages), and with this volume begin the taxonomic revisions (630 pages). Genera keyed, extensively illustrated with distribution maps and line drawings illustrative of each genus. Revisions of 65 natural orders. Djakarta 1954. \$24.50.

Vol. 5. Introductory chapters cover an annotated, selected bibliography by area, by natural orders, and by genera (144 pages), citation of serials and books (20 pages), taxonomic delimitations (65 pages), supplement to Malaysian plant collectors and collections (105 pages), continuation of taxonomic revisions (595 pages). Revision of 24 natural orders. Djakarta 1958. \$28.50.

Vol. 6 (in preparation 1959-1963). Revisions of Cyperaceae, Thymelaeaceae, Verbenaceae, Ericaceae, Menispermaceae, Bignoniaceae, Malvaceae, Capparidaceae, Myristicaceae, Sapotaceae, Moraceae, etc.

Series II. Pteridophyta (Ferns and fern allies). Vol. 1, Part 1, is now in preparation. Dr. R. E. Holttum, who retired three years ago as professor of botany at the University of Singapore and is now attached to Kew, is editor of this volume. Momentarily Dr. Holttum is in the United States.

The *Flora Malesiana*, of which the first three volumes have now appeared, undertakes to present an up-to-date, comprehensive account of the flora of Malaysia (the Malay peninsula, Indonesia, the Philippine Islands, Sarawak, Borneo, Timor, New Guinea, etc.). It is an international project on which 50 institutes and 50 plant taxonomists are collaborating. The flora is an entirely new, original publication, which in due course will include a critical account of between

25,000 and 30,000 species belonging to 2,400 genera. Even with this extensive coverage, so many areas still remain unexplored botanically that the compilers believe that the bulk of the task still remains to be done, for of orchids alone more than 5,000 species are known, of trees more than 3,000, etc. Java alone has 500 kinds of ferns. It is hoped to complete the flora in 25 years. Meanwhile at least one volume a year is promised.

The volumes covering the taxonomic revisions are expected to number about 15, but this is only Series I of the Flora. Series II will cover the ferns in 3 volumes, Series III the mosses and hepatics in 5 volumes, Series IV the fungi and lichens in 3 volumes, and Series V the algae in 3 volumes. Only Series I is in actual production.

Because the first three volumes are of general interest to many scientists besides botanists, they are available separately, but beginning with Vol. 4 the books are available only on a subscription basis for the whole of Series I as published.

Two new and commendable ideas are attached to the publication of the taxonomic revisions. The monographs are published in the order in which they are completed and no attempt is made to follow a taxonomic sequence. There will be no publication delays resulting from late manuscripts. Another feature is a complete cumulative index at the end of each volume, so that reference to the most recent number makes it possible to find immediately any natural order, genus or species that has been completed so far.

The magnitude of the flora is a bit overwhelming because collectors and collections in that part of the world go back to Marco Polo, the area covered is 5 million square kilometers, and 989,492 plant specimens have been gathered for the authors and compilers to describe. When they get done, Malaysia will be the first tropical region with a complete and modern flora.

EDWIN A. MENNINGER

Contemporary Perennials.

Roderick W. Cumming and Robert E. Lee. The Macmillan Company, 60 Fifth Avenue, New York 11, New York. 1960. 363 pages. Illustrated with Line Drawings by Allianora Rosse. \$6.95. (Library)

A well known nurseryman from Bristol, Connecticut, and a professor of floriculture at Cornell University have given the gardener a much-needed, up-to-date book on selected herbaceous perennial species and their cultivars. The first 48 pages, which include planning, planting and care of the garden, offer good practical information. The body of the book alphabetically describes each genus which is followed by the garden value, soil and exposure, care and propagation along with species and cultivars of note. Selected lists conclude this timely and knowledgeable guide to growing better perennials.

It is of interest to note that the generous dedication is "to E. O. which stands for Each One who has in any way contributed to the successful completion of this book."

LOIS W. PAUL

Gardens in Winter.

Elizabeth Lawrence. Harper and Brothers, Publishers, 49 East 33rd Street, New York 16, New York. 1961. 218 pages. Illustrated. \$4.50. (Library)

This is an enchanting book by the author of *A Southern Garden* and *The Little Bulbs*. Miss Lawrence writes of her own garden in Charlotte, North Carolina, and she gives us first hand knowledge of how the various subjects react in her garden. She shares with us information on these same plants in other climates, and under other conditions, brought to her through her correspondence with other gardeners in every corner of the United States and abroad.

We meet many new people in her book, and renew acquaintance with old friends. B. Y. Morrison and Mr. Krippendorf tell us of plants growing as far apart as Mississippi and Ohio. We read of such well-known gardeners as the late E. A. Bowles and Canon Ellacombe, Miss Jekyll, and countless others, who were aware of the delights to be found in the winter garden.

Caroline Dorman, whom we encounter eating berries of *Elaeagnus umbellata*, did the fine illustrations, and the list of the sources of plants at the back of the book should prove very useful—it covers a wide area of the country, as well as one or two places outside the United States.

F. P. K.

Palms.

Desmond Muirhead. Dale Stuart King, Publisher, Six Shooter Canyon, Globe, Arizona. 1961. 140 pages. Illustrated. Paper Back \$1.95 (washable vinyl cloth on boards \$3.20). (Library.)

The author is British, British trained, but with practical experience in many places out of Britain, and apparently only recent experience within the United States. His point of view is that of the landscape architect and city planner and his text is particularly valuable for precisely that reason. The text is illustrated by half-tones of varying clearness and excellence, and many sketches by the author that emphasize the particular design values of the palm shown. There are also several design plans in the back of the book that show the use of palms in large designs, city plans, and some of small residential size. All are provocative.

The text contains any number of opinions that may and should lead to controversial discussions, something that all good design texts should do. In the opinion of this reviewer the book is likely to be of more value to the professional man than the home builder. The point of view particularly stressed is that of the Southwest, which makes an excellent contrast to the books that tell more of palms to the Southeast.

B. Y. M.

Die Nadelgehölze. (Cultivated Conifers)

Gerd Krüssmann. Verlag, Paul Parey, Berlin and Hamburg, Germany. Distributed by Stechert—Hafner, Inc., 31 East Tenth Street, New York 3. New York. 1960, 2nd Edition. 335 pages. 419 figures. \$10.40.

This second edition of the needle-leaved trees or conifers covers essentially the same ground as the 1955 edition but with several important additions to the list of conifers, and a modernized nomenclature. 1483 species, varieties, forms, and cultivars of conifers are listed. The book includes not only the cultivated kinds grown in Central Europe but includes those potentially useful but not yet introduced.

Die Nadelgehölze is a descriptive reference volume designed for persons working with conifers at the practical level. For those who read German, there is a very useful up-to-date introductory piece on classification of the conifers drawn from the latest and most reliable sources. The descriptive list which embodies most of the book begins with *Abies* and finishes with *Widdringtonia*.

The work is handsomely illustrated with distribution maps that clearly depict the geographical distribution of each genus. Detailed drawings are also included and full page illustrations of cones and other details of the plant are scattered amply throughout the work. The closeup photographs that pepper the volume from beginning to end add much eye-appeal and practical usefulness to this book. At the back there is a list of 95 locations, mostly in Europe and America where outstanding collections of conifers exist. A large bibliography is included at the end.

All gardeners, foresters, agriculturists, and users in related fields will soon discover this work to be an indispensable reference work to this most important group of plants. The format and printing are in the highest quality as we have learned to associate with the Paul Parey Press.

F. G. M.

Plant Disease Handbook.

Cynthia Westcott. D. Van Nostrand Company, 120 Alexander Street, Princeton, New Jersey. 1960, Second Edition. 825 pages. Illustrated. \$13.50. (Library)

This is a second edition of a valuable reference on plant diseases. It is a book for both the gardener as well as the technically trained person. The author refers to it as a compendium. It is technical in parts but those sections dealing with practical phases of the disease are in terms that the lay person can understand.

The arrangement of the book is essentially as in the first edition, with the major chapter a discussion of the various diseases, their description and control. This is followed by the chapter on the host plants with a list of diseases known on each. The plants listed begin with *Abelia* through *Zizia*.

The author has enlarged the sections on nematodes and on virus diseases to bring in new information which has been found since the first edition. These are important areas in present day plant pathology.

Drawings and photographs help in the understanding plus a glossary of terms. The serious student will appreciate the extensive bibliography.

C. B. L.

Hawaiian Flowers & Flowering Trees.

A Guide to Tropical and Semitropical Flora. Loraine E. Kuck and Richard C. Tongg. Charles E. Tuttle Company, Rutland, Vermont, and Tokyo, Japan. 1958. First paperback Edition, 1960. 158 pages. Illustrated. \$2.45. (Library)

This paper-back book, printed in Japan, is a popular edition of an earlier cloth-bound volume. The title would be more accurate if reworded, "Cultivated Flowers and Flowering Trees of Hawaii" for, as noted by the publishers, this is primarily an account of the commoner cultivated flowering plants to be seen in any tropical garden whether it be in Honolulu or Miami, Jamaica or Zanzibar. Of the 100 or more tropicals illustrated in attractive color paintings, scarcely a handful are native to the Hawaiian Archipelago.

The thumbnail sketches give common and scientific names, common family name, country or area of origin, and descriptive paragraphs about the plant but not including culture. A minor criticism has to do with the selection in some cases of common family names. Authors in general would be wise to help standardize such names by always selecting the common name of the type genus which normally appears as the root of the Latin family designation. Thus, *Solanaceae* is better called "Potato Family" (after *Solanum*) rather than "Tomato Family" (page 32), and *Apocynaceae* is better "Dogbane Family" (after *Apocynum*) than "Periwinkle Family" (page 114).

W. H. H.

The Evergreens.

James H. Beale. Doubleday and Company, Inc. 575 Madison Avenue, New York 22. New York. 1960. 285 pages. Illustrated. \$4.50. (Library).

Author Beale, long-time director of the Boyce Thompson Arboretum at Yonkers, New York, brings out a timely book about evergreen trees and shrubs in a style for the amateur gardener. Altogether, the author lists several hundred kinds of evergreens available to gardeners living in the Atlantic states, mainly for New England residents, but the book is quite applicable for residents as far south as Washington, D. C. This is strictly a how-to-do-it book with emphasis on fundamentals the author encourages his readers to accept in selecting kinds of evergreens and how to grow them. The book is divided into two distinct parts:

(1) *Conifers* (pines, spruces, arbor-vitae, cypresses, yews, firs, and junipers) with needle-like leaves and cones (conifer flowers of separate sexes are borne in cone-like aments); and (2) *broad-leaved evergreens*, a very diverse group of woody flowering plants (with flowers in the usual sense), including boxwood, some barberries, a magnolia, many rhododendrons, azaleas, and many hollies, to list only a very few kinds described by that term.

Very few books about evergreens have been produced in recent years. Thus, a book of this scope is timely. A more appropriate title, however, might have been chosen, such as "Ever-

greens for New England Gardens," because outside this area the author is obviously not much at home with his subject. Specific information given about plants that grow best south of New York is often hazy and in a few instances inaccurate. The book might have been more carefully organized. While the content obviously is written for the amateur, most amateur gardeners will not find it easy to use. If an outline format had been used instead of a discursive one the average home gardener would find the book far more useful and informative.

FREDERICK G. MEYER

Orchids. Their Botany and Culture.

Alex D. Hawkes. Harper and Brothers, Publishers, 49 East 33rd Street, New York 16, New York. 1961. 297 pages. Illustrated. \$6.95. (Library)

The author states very clearly in his Preface precisely what he intended to do, and then does it. All is well organized, clearly written, well illustrated and precise. The veriest beginner can find here clear instructions, though often in rather brief form, which may give him momentary doubts of his own understanding. There need be no need of that. In such places where the individual must make his own decision, that is clearly stated, as in the discussion of feeding practices, potting media, amounts of light, and so on.

The illustrations, which are clear, are mostly habit pictures, photographs, some from amateurs, some from professionals and some from commercial men. In only a few cases have drawings been used or reproductions from old publications; all are clear. The author himself has contributed some.

If the amateur, not the beginner, wishes to cavil over anything at all, it may be that the "feel" of the whole book is botanical rather than horticultural, in the sense of cultural practices. This cannot be held as a fault, since Botany comes first in the title!

The Appendix contains much that is well worth reading, a discussion of Names and Classification in which much is touched upon but no mention of the present status in which one may encounter a name for a hybrid population followed by the name of the individual from it, that is named as a start of a clone. Some truly fantastic results come from this. This section is followed by a Phylogenetic List of more importance to botanists than others, and to end all there is an excellent index.

B. Y. M.

Iris for Every Garden.

Sydney B. Mitchell. M. Barrows and Company, Incorporated, 425 Fourth Avenue, New York 16, New York. 1960 (Revised Edition, June 1960). 216 pages. Illustrated. \$4.95. (Library)

A revised edition of a well organized book on the iris written for American conditions. It is

a gardener's book written with a minimum of technical terms. The reader will find suggestions on kind and culture for most sections of the United States. All of the iris types are included—bulbous, crested, beardless, and the bearded types with rhizome and fleshy rootstocks. For the iris fancier cultural suggestions are given for each major type. In addition there is information on cultural variations between the different groups. Iris varieties are discussed in a general way and the techniques of hybridization described and illustrated. The appendix provides a list of high rating bearded varieties, a list of species in their order of bloom and lists of sources of additional information on iris and sources of plants. A practical book for those with a special iris interest. C. B. L.

All About Begonias.

Bernice Brilmayer. Doubleday and Company, Inc., 575 Madison Avenue, New York 22, New York. 223 pages. Illustrated. \$4.95. (Library)

Begonias are a varied and interesting group of plants which deserve more attention by those who want interesting house plants. The author first describes the general culture of begonias, with such subjects as propagation, conditions necessary for their growth and soils. In the chapter on pests and problems there is a helpful guide in diagnosing difficulties in growing of begonias and what may be done to correct them.

The major groups of begonias are described with cultural suggestions for that specific type and lists of species and varieties. These lists have a brief description of each kind and are divided into those for beginners, for advanced growers, for collectors and in some cases those "varieties to watch and wait for," the newest.

The illustrations and pictures add to the usefulness of the book, especially to illustrate cultural methods and to show the great variation in this genus. C. B. L.

Chrysanthemums Indoors.

Vera Todd Bayles. Hearthside Press, Inc., 118 East 28th Street, New York 16, New York. 1960. 92 pages. 51 illustrations (54 photographs). \$3.50. (Library)

To the horticulturist the title of this book is misleading; this is one dealing with chrysanthemums as material in flower arrangements and decorations. Principles of design are discussed, using the chrysanthemum as the featured flower. Corsage making is illustrated using the chrysanthemum. One chapter is concerned with the culture of chrysanthemums in pots or other containers for decorative use. It includes the training of plants as cascades with sketches to show the technique. A short section is devoted to the method of growing chrysanthemums as bonsai plants and this is illustrated with photographs of a plant on a large rock. The chapter on a chrysanthemum show and the classification is a start but not enough information to help anyone very much if they were to organize or manage such a show. C. B. L.

Japanese Flower Arrangement, Classical and Modern.

Norman J. Sparnon. Charles E. Tuttle, Rutland, Vermont, and Tokyo, Japan. 1960. 264 pages. Illustrated. \$15.00. (Library)

What more can one want in a book?

No pains have been spared to make this the most informative and inspiring book ever written on Japanese flower arrangement. There are one hundred and two full color photographs and drawings, plus one hundred and fifteen black and whites. It is printed in Japan; book design and typography are by M. Weatherby. This is a full course, step by step, on classical and modern, authentically based on two of the most reputed schools in Japan—Ikenobo and Sogetsu. It is wholeheartedly endorsed by both.

Mr. Sparnon, having spent many years in Japan, is fluent in both spoken and written Japanese. He is a fully accredited master and a director in the Sogetsu School and an ardent supporter of Ikebana International.

This is for those who appreciate this fascinating Oriental art.

HEATHERLY D. ABERNATHY

Japanese Flower Arrangement For American Homes.

Mary Badham Kittel. The Viking Press, Inc. 625 Madison Avenue, New York 22, New York. 1960. 168 pages. Illustrated. \$6.95. (Library)

Mrs. Kittel has expressed in her book hope that the Japanese method of decorating with flowers might be adapted to our western homes. She has realistically ruled out the haphazard or careless flower arrangement and has proven that fundamental knowledge of classic tradition and rules are necessary. Her drawings of holders, containers, stems, and how to use them, are excellent and simple enough for even the beginner to understand. She shows manual skill in technique, efficiency in mastering the basic principles, and easy ways to good flower arrangement.

HEATHERLY D. ABERNATHY

Other Books Added to the Library

Citrus Fruits.

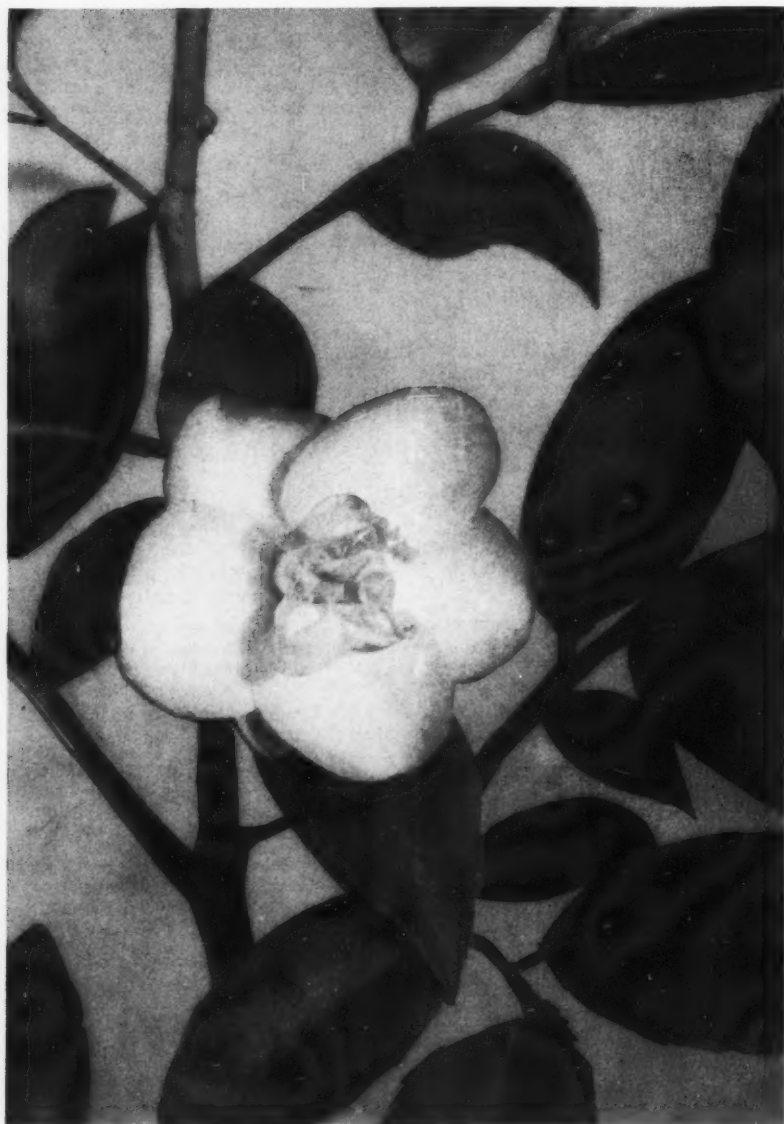
H. Harold Hume. The Macmillan Company, New York, New York. (Revised Edition of *The Cultivation of Citrus Fruits*). 1957. 444 pages. Illustrated. \$10.50. (Library).

The Observer's Book of Cacti and Other Succulents.

S. H. Scott. Frederick Warne & Company, Inc., New York, New York. 1958. 159 pages. Illustrated. \$1.25. (Library).

The Manual of Shrub Roses.

G. S. Thomas. Sunningdale Nurseries, Windlesham, Surrey, England. (1957-1958). 80 pages. Illustrated. 3s.



IVAN N. ANDERSON

Camellia × "Little Princess"

The Gardeners' Pocketbook

Camellia × "Little Princess"

In the January 1961 issue of the *Journal of the American Camellia Society*, page 34, is the official description with registration number (No. 525) of this charming hybrid originated by Mr. K. Sawada, to whom we owe many other delightful camellias.

The note furnishes several very important facts, particularly that the plant is slow if grown from cuttings; but will make a good plant quickly if grafted on a large understock.

The Editor's plant was given him by Mr. Sawada himself and is still in the original can, having been kept this first winter in the cool greenhouse in order to be sure to see the flowers in perfection, since, if it resembles its *C. fraterna* parent, it would surely bloom during the period when winter frosts may, and often do, come, when one wishes sorely for frost-free nights. The understock appears to be no more than three-quarters of an inch in diameter, if that, and the top is now about eighteen inches high with good branching, and at the time of this writing, mid-April, there are fine new growths from every possible point. The direction of the main stem is slightly over-arching and the branches all have the same fine curve, all of it, much as in *fraterna* itself.

The leaves are mat in surface, a nice middle tone of green, and the young leaves have a fine range of bronzy tints, as in *fraterna*.

Actually the plant differs from *fraterna* chiefly in the doubling of the flowers, and the fact that the flower clusters, borne on short axillary spurs, are more often facing upwards than not. While the writer of this note has a possibly sentimental bias in favor of *fraterna*, until the plants of that species are of fairly good height one does not see the full beauty of its flowers, for they hang downward and even when in some quantity, do not make a good showing of their beauty.

As has been noted in this magazine before, seedlings of *fraterna* itself grow slowly but once well established make faster growth than in the first three years. It does not hold all its leaves as well as in many camellias of other provenance, but has quite enough. When it has settled into its stride, it flowers well and if December and January do not have too

many frosty nights makes a good showing. The innermost three petals are much larger than the others, pure white, while the others may be tinted with pink, and the sepals are definitely rose pink.

In the Little Princess, the petals are as in *japonica* with a fine set of petals next the calyx, and various inner petals of smaller dimensions, as it flowered here, but no petaloids here nor were there any single flowers. Diameter, about two inches.

The pale rose color is deepest on the margins of the petals, and fades gradually into white in the center of each. If there are not too many petals, some stamens show with the contrast of the golden pollen on the open anthers.

There is a faint scent, rather like that of *fraterna*, but not enough to perfume the air.

No effort was made to self-pollinate the blooms but this season, with its continued cold, did not permit much success with the pollination (self again) of the blooms on *fraterna*, a species that here rarely makes more than one or two fruits if left to itself, and not hand pollinated. Frequently there are no more than two, and often only one seed per fruit.

Now that the Camellia Society is concerned with finding new types of camellia blooms, possibly others will want to work on this Chinese species, either as pollen parent or vice versa.—B. Y. MORRISON, *Pass Christian, Mississippi*.

Gardenia jasminoides

If the reader is of the male sex it is almost certain that sooner or later he will wear a gardenia in his button-hole either at his own wedding or as best man at his friend's. Does he on that occasion consider from where the flower came or who was responsible for introducing it into cultivation in the western world! For centuries it has been known to the Chinese but only recently to the white man. Robert Fortune, whose travels in China commenced in 1843 inaugurated a new era in the history of botanical discoveries in that country, was responsible for introducing many lovely plants into England. In his book, *Three Years' Wanderings in China*, published in 1847, he writes of plants seen by him at Soochow-foo "... and a *Gardenia* with large



F. WILBUR SEIDERS

Diospyros texana (old "picturesque" tree) used in the landscape of a Houston architect's office. Ground cover plant is *Trachelospermum jasminoides*.

white blossoms like a Camellia." This variety was later named *Fortuniana* in his honor. The species from which this and other double-flowered forms have been derived is *G. jasminoides*, a native of South China, possibly also of Japan. *G. florida* and *G. radicans* are synonyms. In his book, *Plant Hunting in China*, E. H. M. Cox refers to the fact that in 1848 Fortune found that in Shanghai good plants of the fine form of *Gardenia florida*, called after him, were on sale at two shillings a hundred.

The single-flowered wild form is common in ravines in Hong Kong and in South China. When in flower, in April and the first half of May, the shrub, which grows from three to nine or ten feet, is very attractive. The flowers have a simple grace, as of a debutante, each poised at the tip of a side shoot and facing heavenwards. A shrub may have 100 flowers out together and their fragrance, sweet but with a soupçon of mushroom, carries for several yards. The flowers have six to nine petals held in a plane at right angles to the tube. As they age they change from white to ivory, then to pale yellow. The almost sessile anthers curl back between the petallobes. The calyx is more developed than in the double forms and persists. The fruits are very characteristic; they are ridged berries, the ridges continue into the calyx lobes which flare outwards. In the autumn the mature berries turn from green to a rich orange splashed with red. Birds peck at the berries and eat the seeds. A yellow dye may be obtained by boiling the macerated fruits in water and has been used by the Chinese for many centuries; it was mentioned by Chau Ju-Kua in Canton about A.D. 1200.

The drawings of the wild form indicate its simple elegance; that of the double form was of a half-starved specimen, the only one available, drawn in Stanley Internment Camp, Hong Kong.—G. A. C. HERKLOTS, *Katmandu, Nepal*.

The Texas Persimmon

The Texas persimmon, *Diospyros texana*, grows naturally from the Houston area to west Texas, and into adjoining Mexico. Its appearance is so different from that of the eastern persimmon, *D. virginiana*, that they seem scarcely related when one first looks. An east Texan acquainted with the common persimmon unbelievably said, "I've shook

many a possum out of persimmon trees that didn't look anything like that!"

The leaves of the Texas species are about one-sixth the size of those of the eastern persimmon, the gray bark on older trees is smooth instead of rough and the fruit is black, not orange to brown. The fruits are alike in shape and taste, however, and the only other similarity is that the roots of both trees are black. In the southern part of its range our tree is evergreen.

In the western part of the State it receives about one-fifth the amount of rainfall it receives in Houston, and in arid rocky regions it has less foliage and the growth appears more gnarled than ever in the East.

Landscape architects have used it in patios and courtyards where its light colored bark, twisted and gnarled appearance, with dark green leaves, make it a character tree of value, but on range lands it is often a pest like other chaparral.

Pistillate trees, in five gallon cans and at four years of age and often four feet tall, bear fruit. The fruit that has sometimes been used as a dye, varies in eating quality as does the fruit of the eastern species, though there is some variation among trees, and many consider the flavor inferior to that of the eastern species.

Seed from partly green fruits will sprout in twenty days. Well-ripened seed is usually slower.

The Texas persimmon can withstand a temperature of 10 degrees F., or even colder. It grows best in well drained soil and does not appear to require the alkaline soil that is common over most of its natural range. It does not produce the multitude of sprouts that are common from the eastern kind, which rarely overlaps it in range. Its mature height in arid regions is often no more than nine feet, and may be less, although it will grow much larger under more favorable conditions.

It is sometimes known as Mexican persimmon or chapote.

Although grown chiefly as an ornamental, one can only wonder if it could hybridize with *D. virginiana*, whether or not it would take a rootstock for other species, and whether it is worthy of any further work to get its value complete, not merely as a picturesque ornamental. —LYNN LOWREY, *Houston, Texas*.

I Eat One *Arbutus unedo* Fruit

To make a statement in print is all that is needed to have it proved untrue. I had no more than written that *Arbutus unedo* never fruits in these parts, when I looked up into the deep green branches of the one in my garden, and saw two small red balls and one smaller pale yellow one. This was in November when the branches were tipped with bunches of little white flowers. The shrub has been growing there for eight years, and the one in my Raleigh garden had been there for ten years when we left, but these are the first fruits I have ever seen.

It was well that I looked up when I did, for a few days later, when I went out to admire them, I found that the yellow ball had disappeared, one red one was shrivelled, and the other was on the ground. I tasted the one that had fallen. It was insipid, but of a pleasant custard consistence; the only disagreeable trait is the granular skin, which needn't be eaten. I found no seed, but perhaps I ate them without knowing it.

Arbutus is hard to transplant unless it comes in a can, and it seems to be tender when young, but once established I find it more weatherproof than many shrubs that I consider perfectly hardy. Although it gets off to a rather slow start, this one has grown to ten feet in 8 years. It is said to be tolerant to heat and drought, though it responds to a moist, well-drained soil. It prospers in sand or clay, and in sun or half shade, and tolerates lime though it belongs to the heath family. The one thing it needs is protection from wind.

I have read that cuttings strike well in summer and fall, and also that it is impossible to get them to strike at any time. If the latter is true, perhaps that is the reason that this beautiful shrub is so hard to find. I think I shall try layering. Autumn is the time.

Arbutus is supposed to be a bee plant, "far and wide they feed on the *arbutus*," but I have never seen a bee visiting mine. They spend their time hovering over the sasanquas that bloom at the same time.

So far as I know this shrub has only one fault; sometimes small black spots come on the leaves. Fortunately there is nothing that can be done about this, so it doesn't cause any trouble.—ELIZABETH LAWRENCE, Charlotte, North Carolina.

Experiment With Two Conifers in Alabama

There is something very fascinating about trying to grow native trees and shrubs outside their natural ranges. One might call this an experiment in ecology, for one must try to match as closely as possible, a site condition in the new home comparable to that of the original habitat, if possible.

The writer has tried to do this, using California redwood (*Sequoia sempervirens*) and Canada hemlock (*Tsuga canadensis*). Aside from the pleasure of trying this out, there is another reason: I like them as ornamentals. The Redwood Forest in California is very beautiful and the hemlock brings back memories of the quiet wild ravines of beech, cottonwood and Jack pine behind Michigan's coastal sand dunes.

The "almost" subtropical Gulf Coast of Alabama would not seem a likely place to grow these two conifers. The long hot summer with its daily round of 80 degrees F. mean temperature, is hard on plants from cooler regions, yet it is possible to find ravines and shaded hill slopes that offer a different exposure for these plants, than do the hot Turkey oak-Longleaf Pine ridges inland. It is in such a situation that I have planted the redwood and the hemlocks. The broken shade, higher soil moisture, and mulch seem to be the key to their survival to date.

There are eight hemlocks planted and they have been in the ground three years. The parent trees from which the seeds were taken are in North Carolina, Connecticut, and Canada. All have good color in the foliage, and range in height from eighteen inches to three feet. The plants from the southernmost seed source are the largest but all have exhibited the curious phenomenon of elongating the tip growth in late March or early April and then stopping growth about June for the remainder of the season even though conditions seem right for them to continue growing with another flush or two. This probably explains their slow growth.

The redwood, on the other hand, grows with considerable vigor and matches a nearby *Taxodium distichum* in this respect. It has not been planted long enough in this region to make any conclusions about its adaptability but it certainly has started out with promise.



G. HAMPFER

Anthurium warocqueanum

This raises another question: why does the redwood show such promise of enduring conditions in the deep south while the coastal Douglas-fir does not, at least to date?

These two trees grow side by side in coastal California under almost identical conditions, but here, the beautiful Douglas-fir begins to look anything but beautiful after a short time. The question remains and intrigues me and I plan to continue observations on these species and such others, perhaps, as *Abies religiosa* from Mexico and *Pseudotsuga macrocarpa*, the Big-cone Spruce.—E. J. HORDER, Mobile, Alabama.

In modern times, the numerous members of the Arum Family (ARACEAE) are increasingly popular with plantmen, such genera as *Caladium*, *Philodendron*, *Zantedeschia*, *Dieffenbachia*, *Monstera*, and *Scindapsus* being widely grown. The largest genus in the ARACEAE, *Anthurium* (with an estimated 600 species, all indigenous to the Americas from Cuba and Mexico southward), also contains numerous representatives which have found a favored position in our collections.

The cultivated Anthuriums are basi-

cally divided, from a horticultural point of view, into two distinct groups—those grown for their “flowers” and those grown for their “foliage.” *Anthurium andreanum* and myriad hybrids derived in large part from it make up the bulk of the first group. The subject of the present brief note is a representative of the second group, the “foliage” *Anthuriums*.

Anthurium warocqueanum must certainly be classed among the finest and most spectacular of all the genus—and indeed, is usually considered to be one of the most handsome of all araceous plants. Indigenous to the warmer parts of Colombia, it has been in cultivation for many years, but even today is a rarity in our collections, this due to its relative unavailability in the trade, and also to its somewhat refractory temperament. Its appearance may be ascertained by examination of the accompanying photograph, made of a superb specimen at Longwood Gardens, Kennett Square, Pennsylvania.

In the wild generally growing epiphytically in dense, humid forests, this fabulous *Anthurium* consists of a relatively robust caudex, copiously rooting, from which arises a quantity of leaves, these of considerable longevity. As is the case with most members of this genus (and of most aroids, for that matter), a certain amount of clonal variation occurs, with the largest and most valued forms bearing leaves individually measuring somewhat in excess of four feet from tip to tip. These are arranged in a singularly symmetrical fashion, often facing in regular planes, and hang sharply from the petioles. Their coloration is a remarkable velvety dark green, often almost a black-green, with the strongly prominent midrib and principal veins a noticeably paler hue, often almost greenish-white, thus offering a startling and striking contrast to the ground-hue.

The flowers of *Anthurium warocqueanum*, as frequently obtains in the case of these “foliage” species of the group, are relatively nondescript, with an elongate tapering spadix and thin, somewhat twisted, usually dull green spathe several inches in length.

It is a remarkable plant, but one of many hundreds of beautiful members of the varied and fascinating ARACEAE.—ALEX D. HAWKES, Coconut Grove, Florida.

Concerning Tazettas

The tazetta group of narcissus do well in the local sandy flat terrain in our part of Virginia, at least, they do well for all our friends who are not the least interested in the care and feeding of daffodils. In fact, there is a beautiful old tazetta of unknown origin that grows with abandon in Tidewater, Virginia. It has a milk-white perianth with cups of deep cream. One authority called it “Seventeen Sisters.” Another said it might be Scilly White. Some one else suggested that all tazettas of that type are known as White Pearl, not the White Pearl listed as Class 2 C in the 1958 *R.H.S. Classified List of Daffodil Names*, but a true tazetta in the old sense, botanical not horticultural.

Six years ago we dug some of these bulbs from an ancient historic but deserted garden, where they had been neglected for years. With utmost care, we divided the clumps and planted the bulbs in deeply spaded, rich soil. The result has been disappointing. Every year the foliage has been frozen and only rarely are there blooms. In contrast, our neighbors have a profusion of blooms with up to twenty flowers per scape, from their neglected and unfed clumps.

Soliel d'Or has responded in the same manner for us. Years ago we dumped our discarded forced Paper Whites back of the Smoke House. After a few years, they bloomed profusely about Christmas time in their outside location. No one seemed enthusiastic about walking to the rear of the smoke house late in December, so we moved them to beds close to the house. We have not had a single bloom since we transplanted them. Can it be that if the tender foliage is left in masses, it would provide a natural protection against severe winter freezes? Or do they prefer poor untended soil? We have several named varieties of tazettas, all of which suffer from frost-bitten foliage. *N. compressa* from Alex Gray is perhaps the most beautiful and robust. It has pure white perianth segments of good substance and large beautifully formed deep primrose goblet-shaped cups.

For the past two years, *N. panizzianus*, also from Gray, bloomed outside in September. It is a starry-shaped flower with many flowers to the scape. Hiawasee, bred by Edwin C. Powell but obtained from Mitsch, is an exquisite late and

very hardy pure white tazetta, but often it produces only three or four flowers per scape. *N. canaliculatus* will not bloom for us, after the first year. *N. dubius* is beautiful but fragile and temperamental. Haligny does very well but its huge flower head on a short stem gives it an awkward appearance. *N. bertoloni* also from Gray, bloomed just once and was not especially pretty. His *N. odoratus* is strikingly similar to our locally established tazetta. (We asked Gray why we could not find this name in the R.H.S. Classified List, and he replied that he had coined it, but that it was indeed Class 10!)

In the autumn of 1960 we planted Grand Monarque, White Pearl and Hors d'Oeuvre; also Gray's new miniature bred from *N. canaliculatus* x *N. minor*, and hope it will perform as well as his Shrew, which is of the same parentage and a real miniature. We will report results later.—MRS. RICHARD N. DARDEN, Jr., Newsoms, Virginia.

Growing Tree Ferns Outdoors in Northern Florida

Usually when one thinks of tree ferns being grown in this country a picture of them in a glassed house comes to mind. I have found one species, however, *Alsophila cooperi* Hook. ex F. Muell. (passing incorrectly in the trade as *A. australis* R. Br.) to be surprisingly resistant to cold. For over 12 years I grew a specimen outdoors at Gainesville, where it survived temperatures of below 20°F. on numerous occasions. But, after it had attained a trunk height of over seven feet it ironically succumbed to an attack of termites. I had believed that these insects feed only on dead plant material but the entire central, non-vascular portion of the trunk had been completely eaten by these pests. I have lost many other tree ferns in this manner, but thoroughly dusting the lower portion of their trunks and the soil about them within a radius of a foot with 5% chlor-dane powder once a year affords complete protection.

To propagate this species one must raise them from spores as, unlike most ferns of temperate regions, the stem does not branch nor does it form offshoots from the base. Spores are produced on the underside of fronds of plants that have attained a trunk height of about

two feet. At Gainesville spores are produced in early summer. After the sori (spore-bearing areas) have turned dark brown, a portion of frond with ripe (but still unopened) spore cases, may be put in an envelope and sealed. Within a day or so the spores are shed and may be prepared for sowing by shaking them through a fine handkerchief held over a sheet of clean white paper. This procedure separates the spores from debris which might cause mold to form after the spores are sown. The spores remain viable for only a month or so. I have found that dusting the spores on the surface of Hyponex solution two teaspoons per gallon of boiled water contained in a flat glass dish and covered with a sheet of glass and placed in a north window, will carry the sporelings to a stage suitable for transfer to a soil medium.

If the spores are sown directly on soil, the spores of many other species of ferns are present which outgrow the tree ferns. After a month to six weeks most spores should have developed into flat, heart-shaped structures floating on the surface of the solution. At this stage they may be poured on the surface of compacted dark peat, filling a six inch pot to within about one and a half inches of the rim. The pot may then be buried to within one and a half inches of the top in soil that is well shaded. Cover the pot with a sheet of glass. The glass cover is most important since rain on the sporelings of this stage, less than one-eighth inch in diameter, will kill them. After the plants have attained about one-quarter inch in diameter they should be wetted at least once a week by dipping the pot in water and letting the soil become thoroughly saturated. A film of moisture must be present to allow the male gametes formed by the sporeling to swim and fertilize the female gametes.

Usually about four months after the sowing of the spores the first small leaves of the ferns will become evident. The first leaves do not look fernlike, but each new frond will more closely resemble those of a mature plant. I have had best success if I allow the young ferns to develop fronds about two inches long before transplanting to moist peat. One should obtain at least 50 plants from a six inch pot if this procedure is followed. If the spores are sown in July, two inch plants should be attained by spring.



ALBERT M. LAESSLE

Alsophila cooperi as grown outdoors in Northern Florida

During freezes I cover my young ferns and sporelings with a corrugated cardboard box.

If monthly fertilization with Hyponex solution of the same strength used in culturing the spores is practiced, ferns with 12-15 inch fronds should be attained by the end of the following summer.

Ferns of this size may be planted in permanent locations. They will grow faster if they receive about half a day of full sunlight but this increases the water requirement and the soil must remain moist at all times. Quite heavy applications of commercial fertilizers may be made, being certain that none is applied closer than six inches to the crown. This will also speed up the growth rate. A trunk growth of one foot a year is not difficult to achieve after the ferns have formed a trunk above the ground. But, it usually takes about three years from the spore stage until a trunk is formed.

High shade is very helpful in preventing frost from killing the fronds. This factor is important since frost may form on open sites at temperatures above freezing. Fronds so protected by high shade will stand temperatures of about 25°F. If all expanded fronds are killed by temperatures below 25°F., new fronds will form when warm weather returns, provided the "bud" is not killed. The dense covering of scales and frond bases, however, form sufficient insulation about the "bud" to protect it at temperatures of 20°F., if this cold is not of more than a few hours duration.

Wrapping the buds with Spanish moss, blankets, etc., will protect them from more severe cold. Even these precautions failed me, however, in the winter of 1957-58 when the temperature at Gainesville reached a low of 16°F. and remained below freezing for 14.8 hours and 22° or lower for 10 hours on the night of December 12-13. When warm weather returned after this freeze the fronds of the protected buds uncoiled and reached a length about 15 inches before collapsing due to the killing of the trunk below. Dozens of tree ferns, some with trunks over seven feet tall, were thus killed. Most that had not yet formed a trunk above the ground survived this very severe cold.

It appears that with a protective mulch, this species could be grown outdoors in the warmer portions of the

Gulf States and also along the Atlantic coast at least as far north as Charleston. When the trunks attain heights that would make winter protection difficult, it might be well to replace them with smaller plants that are more easily protected. Although no fronds might be in evidence from late October until late April 1, the six foot fronds would be so beautiful throughout the summer and early fall that many people would find the care required well worth the effort. —ALBERT M. LAESSLE, *Department of Biology, University of Florida, Gainesville, Florida.*

A New *Lycoris*, Perhaps

While in correspondence with Mr. Kan Yashiroda, in Japan, about another *Lycoris*, he was good enough to tell me of a species, native in his area, that is considered a species by most Japanese botanists, though assigned as a variety to *L. sanguinea* by others. He told me that it grew at a particular altitude level, and that its flowering season was a little ahead of that of *L. radiata*, the other species of the area. To complete the discussion, he offered to collect bulbs for me. At the proper time, they arrived and in quantity enough so a few could be sent to Dr. Traub, to Mr. Sam Caldwell and to Mr. Frederic P. Lee, all of whom are concerned and interested in the genus.

The balance, planted here, have behaved as do the bulbs of *L. sanguinea*, no foliage through the winter and later in appearing than any of the spring producing kinds, except *L. squamigera*. This year, they showed about February fifteenth, but after the leaves had come on *incarnata*, *Sprengeri*, *Caldwellii*, "*Sperryi*" and *chinensis*. Now, in leaf, superficially one could not tell the new bulbs from old bulbs of *sanguinea* or "*cinnabarina*." Blooming may be postponed a year, as newly set bulbs of any *lycoris* often wait, but we are publishing here two prints from photographs taken by Mr. Yashiroda and used by his kind permission. As compared to the flowers of *L. sanguinea*, these appear to be much more open with narrower segments and longer petioles. The color is reported to be about the same, although the color of all *sanguinea* that appears to be in cultivation in this country is



KAN YASHIRODA

Lycoris kiushiana (*L. sanguinea* var. *kiushiana*)

KAN YASHIRODA



so different from the taxonomist's description, that Mr. Caldwell, for one, wonders if we have the typical *sanguinea*.

As all lycoris, except *squamigera* which is variable in performance, are superb things for the Deep South, any new kind is more than welcome.—B. Y. MORRISON, *Pass Christian, Mississippi*.

Mangosteen

A couple of years ago, I was finally successful in securing viable seeds of the Mangosteen, *Garcinia mangostana*. After a year of careful culture, assisted with a bottom heated, humidity controlled wardian case, I started grafting mangosteen scions on any *Garcinia* species or closely related genera obtainable in Florida, with the following results:

All mangosteen scions are growing on these rootstocks, and the following reactions are now evident: New leaves of mangosteen on *Garcinia spicata* are light-green, and darken to normal color with age. Growth of scion seems normal. Mangosteen on *Garcinia tinctoria* shows salmon colored new leaves, characteristic of mangosteen on its own roots, leaves green up to normal with age, but are very close together. Mangosteen on *Rheedea aristata* produces very light green leaves with dark green veins and have not darkened to normal color as yet, growth is very slow. Mangosteen on *Clusia rosea* shows new vigorous salmon colored leaves, but it is too soon since grafting to check further reactions. The term normal is indicated by the appearance of mangosteen on its own roots.

I have *Garcinia livingstonei* stock, but they are too small to graft as yet. I am quite anxious to secure other species of *Garcinia* or other closely related genera to try as rootstocks, but no success so far.

It is much too early in the progress of this experiment to determine complete graft compatibility. If I could contact anyone else in the world, however, that is working along the same lines, we may eventually succeed in locating the most compatible rootstock.

Efforts to establish the mangosteen in Florida have failed because, due to lack of root hairs, it is extremely sensitive to slight water deficits, and possibly to nutrient variation. Some believe that the extreme sensitivity of the plant to cold is the real trouble. Since this fruit is gen-

erally acclaimed to be the most delicious and beautiful fruit in the world, I feel that it is worth the effort to attempt to establish it here. Information leading to securing seeds or plants of any of the other *Garcinia* species would be appreciated.—EDWARD F. THAYER, *Stuart, Florida*.

Growing Tree Peonies from Seed

As an amateur grower of tree peonies for many years, I still find it surprising that this magnificent flowering shrub is so little known and grown by the average gardener. The huge blossoms of many colors, shades, and textures lend spectacular beauty to any garden, making the plant worthy of far greater use.

Perhaps the chief cause of the delayed acceptance of the tree peony, *Paeonia suffruticosa*, by American gardeners is the lack of information as to its cultural requirements. Another factor is probably our characteristic demand for immediate results, for the propagation of blossoming specimens of the tree peony takes considerable time, making them expensive. Tree peonies are for patient people.

A native of interior Asia, under natural conditions the plant was a woods undergrowth. Selections have been made and propagated by the Chinese for so many centuries that the identity of the wild native plant, now almost extinct, has been all but lost.

Many generations of cross-pollination and inter-breeding have made the seedlings, even of the named varieties, highly variable in color and type, ranging from pure white to deep maroon and purple, and from singles with their golden stamens to doubles so full that neither stamens or pistils are visible.

The Chinese, whose art and literature concerning the tree peony date back to the sixth century A.D., stressed full doubles in their variety selections. The Japanese, whose period of culture has been somewhat less, appear to favor singles and semi-doubles.

Owing to the great variability of seedlings, the characteristics of the named varieties have been fixed by asexual propagation, which includes grafting, layering and division.

I shall not here enter into the details of asexual propagation, the techniques

of which call for skills and training not to be expected of the casual grower. Rather I think it is more interesting to invite the reader to the high adventure of growing the unpredictable seedlings, the area from which the named varieties have been selected. The long period of waiting between the planting of the seed and the unfolding of the flower only accentuates the keenness of anticipation and the climax of satisfaction when one views for the first time a blossom of unique loveliness, the exact likeness of which has never before been seen by the eyes of man.

Tree peonies begin blossoming several weeks in advance of herbaceous peonies of the same district. Here, in the upper South, the season begins in the latter part of April, ranging northward through May to June. Coincidentally the ripening of the seed occurs in August in southwest Virginia and correspondingly later in the North.

My first attempt at growing tree peonies was with seed imported from Japan. These I planted early in the spring of 1932 but none came up until a year later, a result that can always be expected from dry seed. The seed, hard, black and shining and the size of garden peas, are best gathered as soon as the pods open and while they still retain their pristine moisture. Never let them dry out. Immediate planting is satisfactory if one takes the pains to provide suitable soil, shade, and vigilant care to see that the soil and seeds do not become too dry at any time before the advent of winter.

My personal preference is immediately to place the seeds in sphagnum, peat moss, or vermiculite, and store in moderate temperatures until sprouting begins, a period of about two months. The seed can then be planted, either in a cold frame or out of doors.

The seed of the tree peony has this peculiarity: after the sprouting root appears it definitely will not develop a top until the sprouted seed has passed through a cool or cold "incubation" period of several months. This fact has been demonstrated and scientifically established by the Boyce Thompson Institute. Under natural conditions the acorn of the oak and the nut of the chestnut exhibit similar characteristics, anchoring themselves to the soil by the sprouting root, beneath fallen leaves, and developing the top when they emerge in the spring.

Planting, whether fall or the following spring, should always be shallow, with the seed scarcely more than an inch below the surface. Like the bean and pea, the cotyledons formed by the division of the seed, will rise above the surface, releasing the tender top from the interference of hard soil. A high humus content and sand used in the soil covering the seed will help prevent baking and hardening. Mulching is helpful in fall planting, but the mulch should be removed early in the spring, for the little plants are early risers.

In their first year the plants will develop from one to three leaves. When these fall in the autumn the plant will scarcely show above ground. Winter mulching is desirable during the following few years to prevent the heaving, due to alternate freezing and thawing, from tearing the tender roots of the young plants.

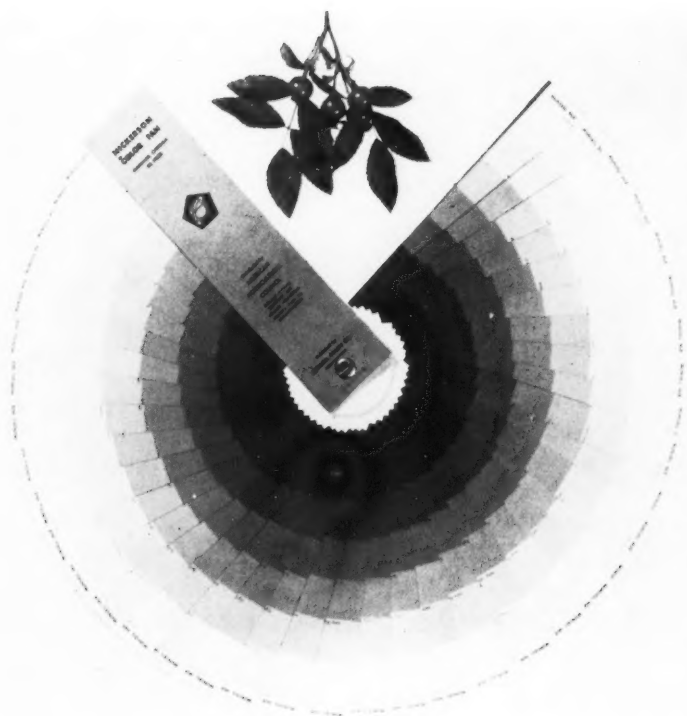
Plants may be spaced a foot apart in the row and left thus until they reach blossoming stage, which takes five or more years. They should then be moved to permanent locations, spaced not less than four feet apart.

Tree peonies do best in deep fertile soil with a high humus content and good drainage. Unlike the herbaceous peony, they do best in partial shade, especially in the upper South and the middle West. The usual height of a mature plant under favorable conditions is from three to five feet, with an equal or greater spread. The older stalks age and after ten to twenty years are best removed to give place to abundant new shoots. Under congenial conditions plants are known to survive a hundred years.

Annual growth starts very early in the spring and is completed by June, even in the North. Do not remove leaves or healthy growth during the growing season, for the spring's early and almost explosive growth and blossoming is dependent on the nutrients stored in the fleshy roots during the previous season.

Tree peonies are very hardy. In the public parks of Rochester, New York, and Milwaukee, Wisconsin, no special protection is necessary in the winter, though a good mulch is always helpful.

For a real flower lover never to make the acquaintance of the tree peony is to miss one of life's most pleasing experiences.—HARVEY F. STOKES, *Roanoke, Virginia.*



Nickerson Color Fan

The American Horticultural Society has been interested for many years in making available to the horticultural public a popularly priced color chart that could be used as a standard in all phases of horticulture. Accurate charts, in the past, have been too costly to publish at a moderate price.

No color chart, except those with a thousand colors or more, can contain all the colors needed by all the various horticultural groups, but the Nickerson Color Fan, which has been approved by America's outstanding color foundation, can well become the standard everywhere.

Included with the color chart is a twelve-page booklet explaining the use of the fan in detail. Printed in small type, on each color, is the popular color name

and its numerical designation in the Munsell System of Color Notations which is fast becoming accepted as standard by many industries and societies dealing with color systems in America. The chart uses color names that have been selected as standard by the Inter-Society Color Council and the National Bureau of Standards.

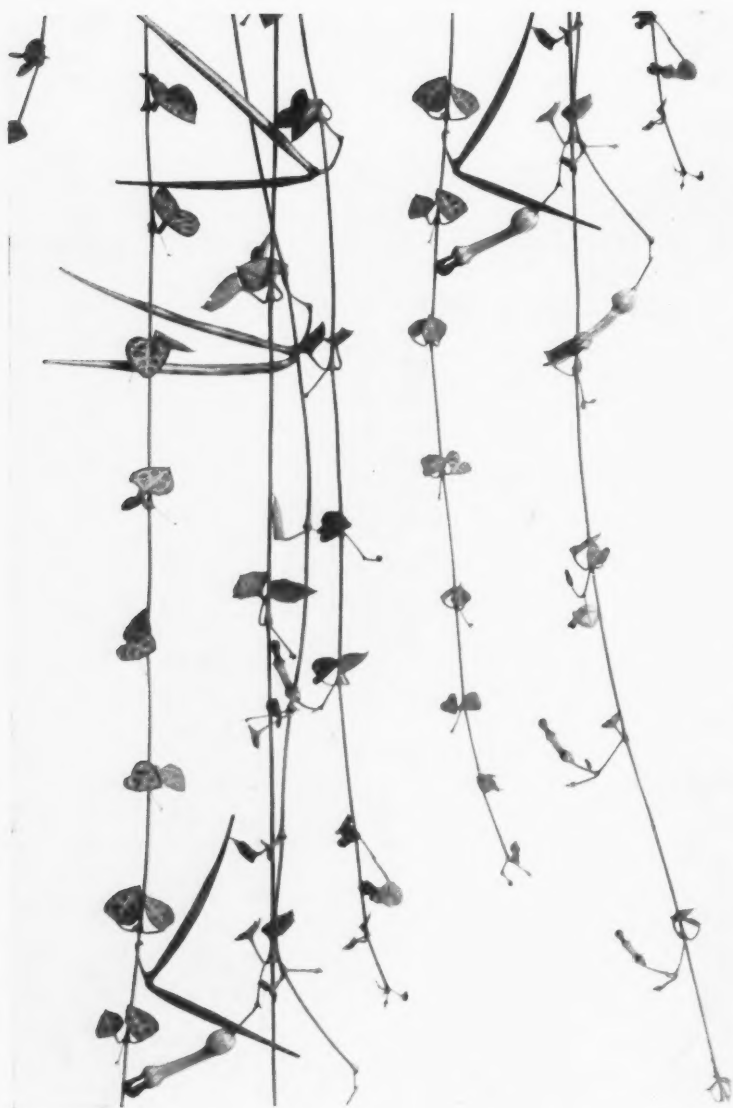
The fan may be opened out and, if desired, a background chart may be obtained on which all the fan leaves may be pasted into the form of a color wheel, to make a complete, permanent color wheel. The wheel-type chart is often desirable for the study of complementary colors in such fields as flower arrangement. However, the ease with which the fan can be folded and carried is one of its valuable

characteristics from the standpoint of both indoor and outdoor work.

The availability of the present fan, through the American Horticultural Society was made possible by a grant from the Longwood Foundation, Kennett Square, Pennsylvania.

Judges who have used the fan report that the color chips are so easy to handle, particularly when working with color classes, that they prefer it to any other color reference.

The Nickerson Color Fan is distributed by the American Horticultural Society at \$6.00 each (\$5.10 to AHS members). This low price is possible only by cooperation in payment with order. Discount for quantity purchases will be given upon request.



LILIAN A. GUERNSEY

Ceropegia woodii

